THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1841.] LONDON, AUGUST 23, 1898. [50TH YEAR. PRICE 6d.

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FOR
GAS, STEAM, WATER,
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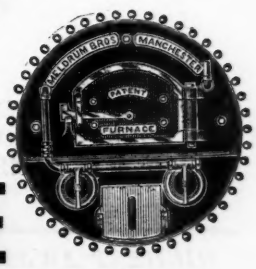

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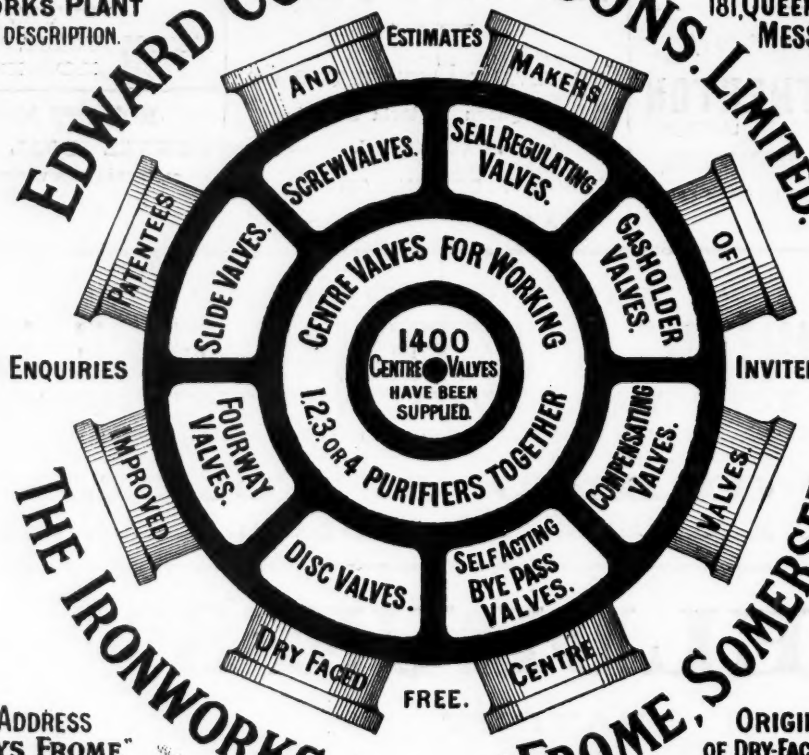

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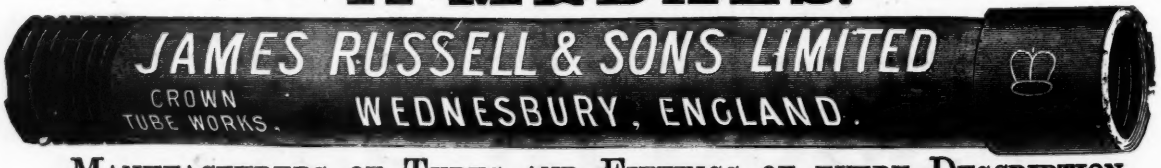

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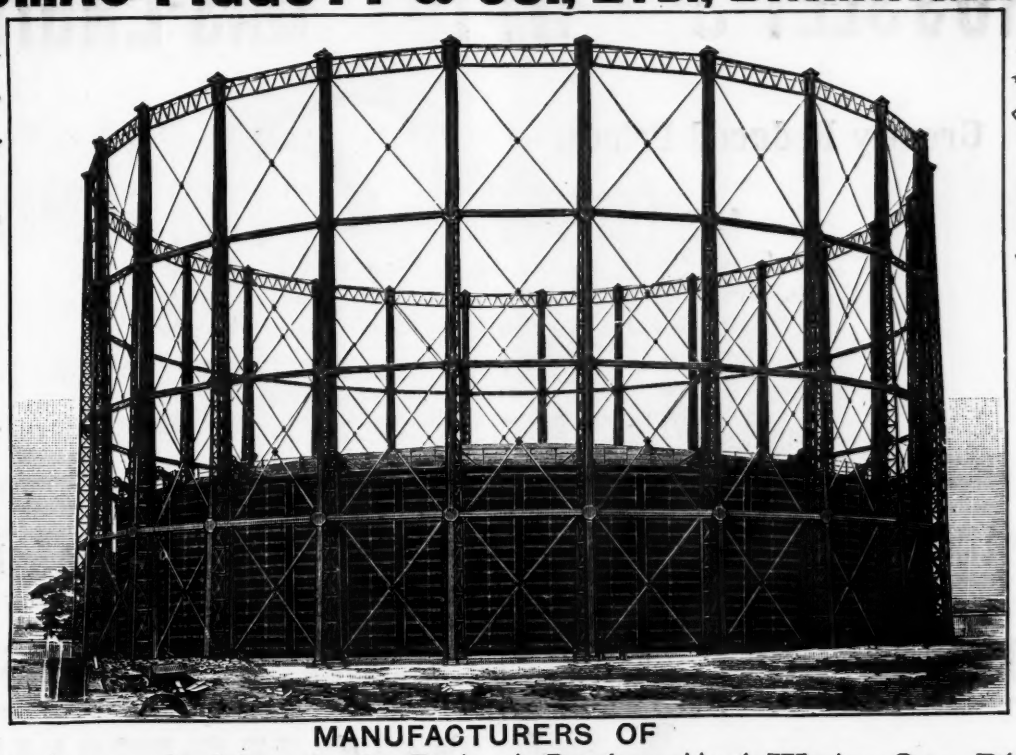

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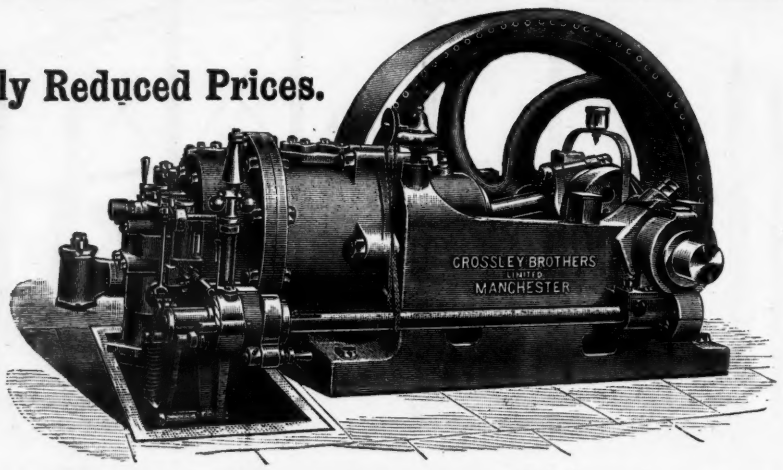

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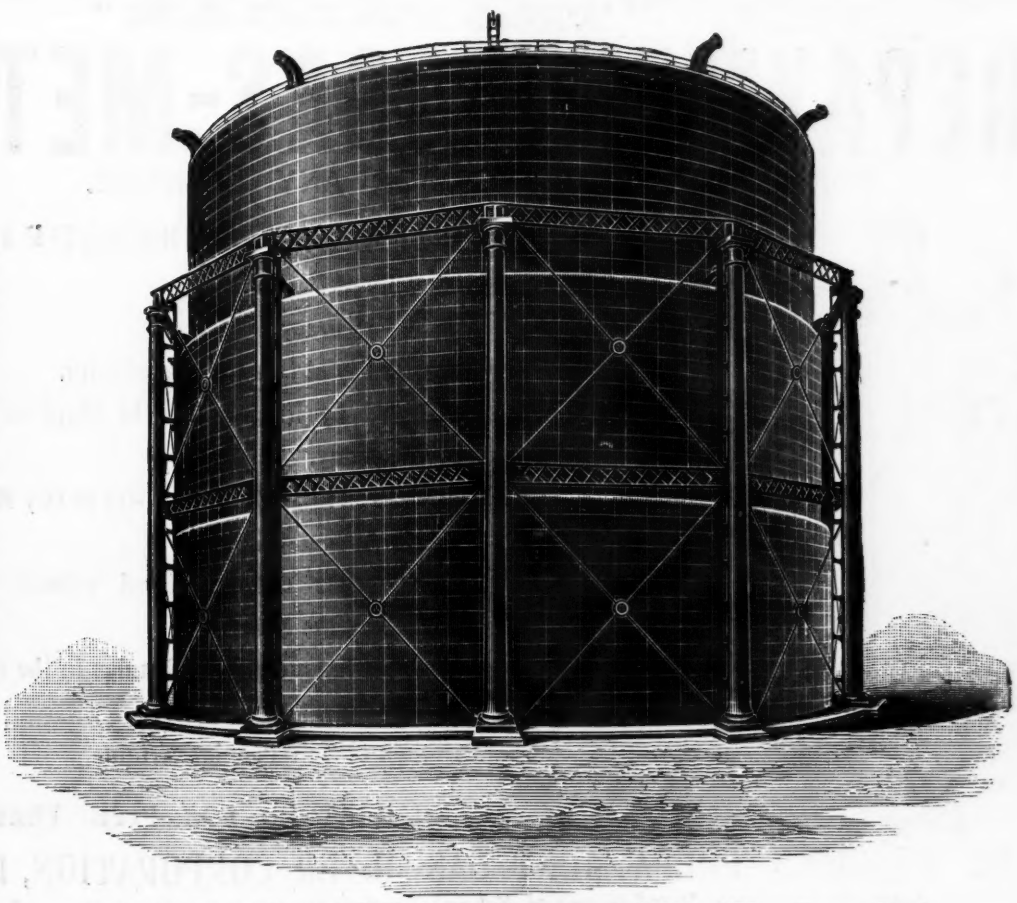

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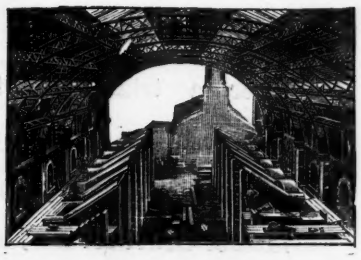

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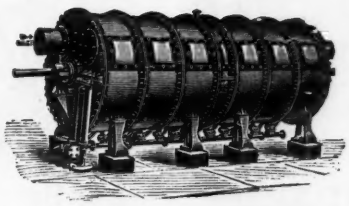

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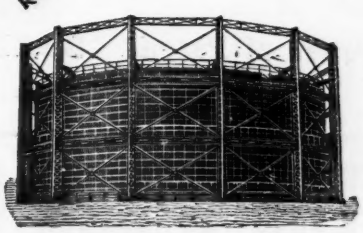

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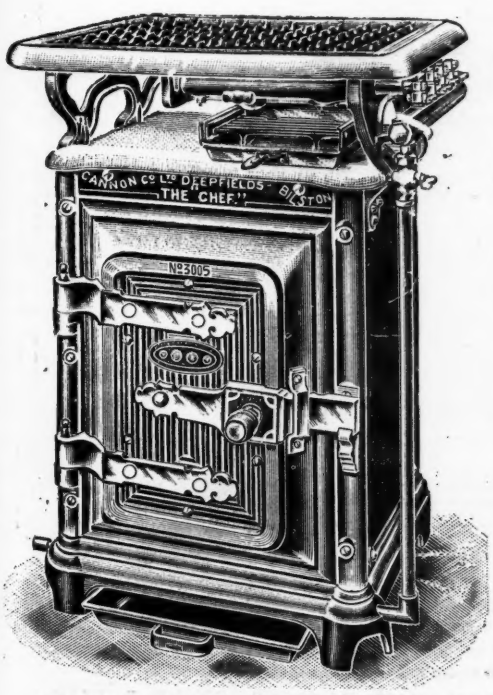

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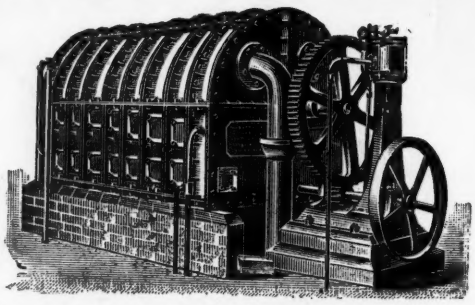

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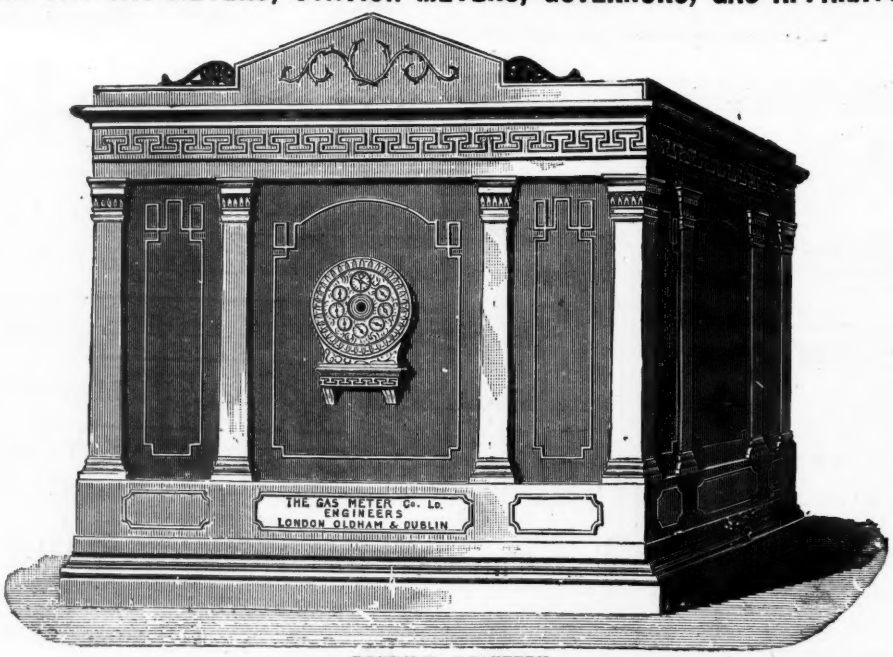

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DESIGN No. 2 PATTERN.

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Belfast (Second Contract)	4,500,000
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Brussels (Second Contract)	700,000
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Liverpool (Second Contract)	4,500,000
Tottenham	750,000
Tottenham (Second Contract)	750,000
Santiago	400,000
Swansea	750,000
Manchester	3,000,000
Brighton	1,750,000
Preston	1,500,000
New York	1,200,000
Southport	750,000
Bath	1,000,000
Newburgh, N.Y.	350,000
Newburgh, N.Y. (Second Contract)	250,000
Hoylake	125,000
Coventry	600,000
Coventry (Second Contract)	600,000
Bordentown, N.J.	125,000
Winchester	200,000
Shanghai	225,000
Stockport	500,000
Norwich	1,000,000
Holyoke, Mass.	600,000
St. Joseph, Mo.	750,000
Lea Bridge	350,000
Lea Bridge (Second Contract)	350,000

	Cub. Ft. Daily.
Edinburgh	2,000,000
Guildford	350,000
Stockton-on-Tees	500,000
Syracuse, N.Y.	850,000
Brentford	1,200,000
Commercial Gas Co.	850,000
Commercial Gas Co. (Second Contract)	850,000
Commercial Gas Co. (Third Contract)	1,250,000
Bridlington	125,000
Middlesbrough	1,250,000
Croydon	1,250,000
L. & N.W. Railway, Crewe	700,000
Taunton	225,000
Lawrence, Mass.	400,000
Rotterdam	850,000
Dorking	125,000
McKeesport, Pa.	500,000
The Gaslight and Coke Co., Bromley	3,750,000
The Gaslight and Coke Co., Nine Elms	2,750,000
Durham	200,000
New York (Remodelled)	11,000,000
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Perth, W.A.	125,000
Bremen	550,000
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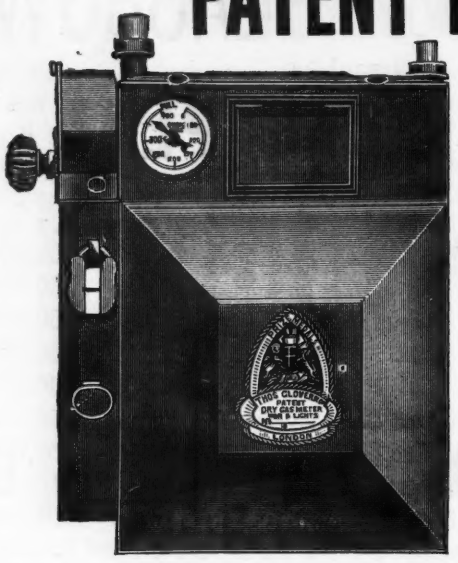

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Simple in Mechanism.
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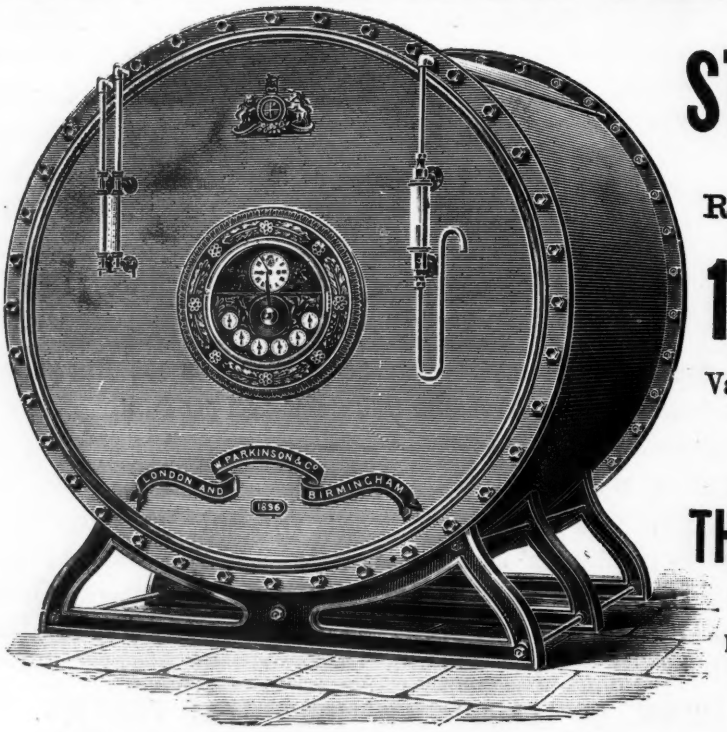

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EDITORIAL NOTES.

The Home Office and Carburetted Water Gas.

A CIRCULAR reproduced elsewhere would seem to indicate that the deliberations of the Home Office Committee on the question of the regulation of the distribution of carburetted water gas in the United Kingdom are likely to have some practical issue in the shape of a positive prescription. It is not to be too lightly assumed that either the nature or the extent of what may be deemed the necessary regulation of the distribution of carburetted water gas as an element of British illuminating gas has been determined upon by the Committee. The whole question is still open; but it appears tolerably evident that the Committee are disposed to think they ought to "do something" in the matter, in the interest of public safety. It is not too much to say that the entertainment of this idea by the Home Office Committee will be very deeply regretted by every British gas engineer who has adopted, or may be inclined to favour the adoption in his own district of auxiliary carburetted water-gas plant. We trust that, before it is too late, those gas engineers who hold that the best thing the Home Office can do with carburetted water gas is to "let "it alone," will take the opportunity now offered of making their protest in our columns. Various gas engineers who have already been before the Home Office Committee have been, we understand, invited by this circular to furnish Lord Belper with their opinion upon a particular point. They are warned that they are not wanted to deal with the general question of whether any legal limit should be put to the proportion of carburetted water gas to be added to town's gas, and, if so, what the proportion should be. This, however, is precisely a question which can be helpfully discussed in the "JOURNAL." And, if the opportunity is neglected, it will be in vain for malcontents to grumble afterwards. Those who are interested in the matter should lay to heart the lesson of the Government Vaccination Bill.

There is in the country a certain amount of clamour for the legal regulation of the sale of carburetted water gas. This is an incontestable fact. The best-instructed technical opinion is that there is no real reason, arising out of any consideration of the public safety, for legal interference with the practice, so far as commercial considerations permit of its being carried in this country. The Home Office authorities are perplexed between these two voices, as well they may be. The old English principle of letting trades and industries alone, at least until somebody was hurt, has of late years been discountenanced by a fussy humanitarianism which cries out before any damage is actually done. In this particular case, there is a certain degree of reason in the argument that the question of public safety should be settled before a vested interest, already growing, becomes overpoweringly strong. Those who want to make carburetted water gas, either for enriching or for supplementing the production of common coal gas, or both, protest against having their hands tied in any way. They desire to be left free to use as much or as little of either kind of gas as the demands of their business call for. We are not aware, however, that any British gas engineer would claim the right of ceasing to make coal gas altogether, if it suited him, and sending out nothing but carburetted water gas in its stead. Yet where is the line to be drawn? Who is to decide how high the proportion of added carburetted water gas is to be; or how is it to be ensured that the permitted proportion shall never be exceeded in the district of supply?

The gas manager will say this had better be left to him. He does not want, for reasons likely to remain operative, to make all carburetted water gas, as they do in some places in the United States. The conditions of the two countries in this regard are not alike. All the same, he does not care to be made liable for all sorts of pains and penalties if he puts in a little more carburetted water gas at one time than at another. This, he will say, is sure to happen if any legal limit is placed upon the admixture of carburetted water gas with coal gas. Besides, how is a legal offence, so created, to be proved against him? Not by anything that could be found out at the works, from books, or by any method of inspection. The public concern is not with what is done in the process of manufacture, but with what exists for the public use in the mains and at the burners. So we are led to a system of testing for carbon monoxide as an indication of the salubriousness of the town's gas; and a pretty business this would be! What

a splendid means this testing would supply of illustrating the different value attached by local authorities to gas examination when the gas happens to be of their own make, as compared with the product of a company! The Home Office should remember this fact of statutory gas manufacture: The adoption of economical methods is at the discretion of the administration. Supposing that a gas company might have a reasonable expectation of selling cheaper gas by adopting auxiliary carburetted water-gas plant, where would be the inducement to do so at the price of undergoing a new and probably vexatious ordeal of testing at the will of a hostile local authority? Compare Belfast and Dublin in this regard.

As for the specific suggestion of the Home Office circular—viz., that "the gas supplied after (say) 9, 10, or 11 p.m. "should be required to contain not more than a stated pro-"portion of carbon monoxide," it is to be described as the sort of recommendation a coroner's jury might be expected to make. The supply of gas to a great city could not be manipulated in this way. If it were enacted that gas containing more than a stated proportion—say, 16 per cent.—of carbon monoxide should never be sent out from any gas-works in the United Kingdom, it would be quite possible to fulfil the requirement. For the condition of the supply afterwards, the legal responsibility of the makers is already assured; but, technically speaking, they have no means of controlling anything besides the pressure. A question may arise respecting the possibility of extending the responsibility of the sanitary authority for the state of gas-fittings in public lodging-houses, and of giving powers of inspection of new domestic gas-fittings to gas companies; but it would be impossible to make these powers conditional upon the manufacture of a particular description of gas. If such a condition were attached to the powers, they would perhaps be operative one week and not the next. The moment one contemplates departure from the rule of non-interference in this matter of the distribution of coal gas containing an admixture of carburetted water gas, the difficulty of what to do and where to stop presents itself. Hence the most exhaustive discussion is desirable.

There are other questions that suggest themselves in connection with this matter of regulating the distribution of carburetted water gas. We have spoken of the legal responsibility of the manufacturers of illuminating gas for the manner in which they discharge their statutory obligations; and earlier numbers of the "JOURNAL" can be cited to show that we have never accepted the proposition that the nature of a town's gas might be changed at the will of the producer, except at his peril. It is not a small matter to interfere between the undertakers of gas supply and the public, before such interference has been shown to be absolutely necessary. Many gas undertakings are restricted by their Acts of Parliament to the supply of coal gas; and if officialism were to oppress overmuch, the development of what is in many places a boon to the public will be checked until Parliament can be persuaded to relax these enactments. If coal gas is to be gas directly made wholly from coal, the bonds of the coalowners will be placed once more upon the gas industry; for not a drop of oil or carburetting spirit will be available for the relief of the gas manager with the fear of the photometer upon him. Far be it from us to desire the occasion, but it does seem safer that the taking of the first step towards the regulation of the composition of any town's gas upon a carbon monoxide basis, should be deferred until some positive evidence as to the insufficiency of the existing law has been recorded. The gas industry has not done anything yet to warrant any increase of government by inspectors.

The Affairs of the Liverpool United Gas Company.

THE affairs and experiences of the Liverpool United Gas Company are always of interest to followers of the gas industry, for a variety of reasons. The undertaking is the largest of its kind out of London, in the possession of a Company; and it is administered without the supposed advantages conferred by the sliding-scale of selling price and dividend. Some few years ago, the Company were actively antagonized by the Corporation. But through good and ill report the Directors held on their way; and the management of the undertaking ultimately justified itself against all detraction. Matters are quieter now as regards the gas supply of Liverpool. The Corporation have outlived the severe epidemic of "Progressivism," which plagued and oppressed the citizens for awhile, and left them as a memento a municipalized electricity supply, which does not check the growth of the gas undertaking. The future development side by side of the gas and electricity supplies of Liverpool will be interesting. For the present, it is worthy of notice that the Directors of the Company do not propose to do anything exceptional to meet the competition of the Corporation electric lighting. They will go on making their gas and selling it as cheaply as possible, and rely fully on this to bring them in their maximum dividends, as of yore. The only "burning "question" concerning the gas supply of Liverpool is the artificial one of the alleged injury done to the consumers by the distribution of a proportion of carburetted water gas with the supply. Certain people in the city have become possessed of the notion that this mixture is detrimental to the consumers in some way. They think the illuminating power suffers, or the heating value is diminished, or the gas when burnt gives off distressing "fumes." All this is, of course, wholly beside the real question of the safety of town's gas containing a high proportion of carbon monoxide, which is engaging the attention of the Home Office. It is no more than a local craze, kept alive by two or three irreconcileables who ought to know better, or have something more profitable to do; and it will run its course.

Co-operation and the Gas Industry.

THE Co-operative Congress, which has been in full swing at the Crystal Palace during the past week, has furnished an opportunity for some good speaking which we cannot adequately deal with in these columns. At first sight the connection between a function of this kind and gas manufacture is not very obvious; but it exists in the profit-sharing scheme of the South Metropolitan Gas Company. This experiment was mentioned by Earl Grey, President of the Festival, in his Inaugural Address. This oration was designed to bring out the higher aspects of the co-operation movement, which have been less talked about of late than they were in the early days of the movement, when Maurice, Kingsley, and Tom Hughes saw in it the road to a new industrial world that was to redress the balance of the old. The question is now co-operative production; the problem of co-operative distribution being practically solved. Earl Grey remarked that it is now only just beginning to be recognized, both by labour and capital, that the principles of co-partnership, which insist that labour shall have an equal share with capital in the surplus profits that remain after the initial obligations to capital have been discharged, are fair to all parties. The progress of civilized mankind, having been from status to contract, is to be from working for wages to co-partnership. Earl Grey focussed the idea into the definite suggestions "that £1 of wage should "receive as much as £1 of dividend, or, in other words, in "proportion to the value of their respective services;" and "that the workers should be allowed to invest their "profits in the business which employed them." This is to convert the joint-stock system, which in some aspects is a curse of the age, into a means of delivering the hireling from his uninterested position, and constituting him a partner with, and friend of, his employers. Earl Grey said some very complimentary things of the South Metropolitan scheme. It is only by the testimony of intelligent outsiders, that those to whom the doings of the South Metropolitan Gas Company are so familiar, as they are to the habitual readers of the "JOURNAL" and members of the gas engineering profession at large, can realize how important and significant these proceedings are. That a Gas Company, so often a synonym for all that is hide-bound in business methods, should be in the front line of industrial and economic progress, is a very remarkable thing.

The Trouble of South Wales—No Peace before November.

THE South Wales colliers' strike is declared by competent and credible witnesses to be likely to last until November. Even now, the strike is a notable piece of evidence in support of the well-known general observation that an empty exchequer never prevented a people from going to war. Money is the sinews of war; yet many a long and desperate campaign has been fought, as the Welsh strike is now being fought, with one side penniless. The side that is without money suffers terribly; but it fights on. The public conscience is shocked at the spectacle presented by South Wales just at the present moment; but the public common sense also realizes that nothing can be done by outsiders to improve matters. Of course, the "popular"

newspapers have all along, and more especially of late, endeavoured to fix upon the employers generally, and upon Sir William Lewis in particular, the whole blame for the sufferings of South Wales. These journals have demanded Sir W. Lewis's head, chiefly on account of his alleged contumacy in refusing to recognize the official conciliatorship of Sir Edward Fry, or to admit the voluntary interference of the Bishop of Hereford. On Saturday last, the publication as a Parliamentary Paper of the correspondence respecting Sir Edward Fry's recent mission wrung from the "Daily News" the reluctant admission that all the blame for the failure of the official conciliator does not rest upon the employers. The latter certainly declined to hold any intercourse at all with Sir Edward Fry; and he says that this aloofness made it impossible for him to form any satisfactory opinion on the merits of the matters in controversy between masters and men, or what were the real intentions of the employees. It might be replied to this complaint that if Sir Edward Fry was ignorant of the masters' position, he was singular in this respect. The employers' notices were posted at the pits; and the conditions they required to be fulfilled on the part of any delegation of the men who might wish to discuss these terms with them had been published and were notorious. If the associated employers had met Sir Edward Fry every day for a week, they could have told him no more than that they were, and always had been, ready and willing to meet any properly accredited and responsible deputation of their workpeople, for the purpose of discussing any points of difference, with the exception of certain principles. There is nothing new in this reservation of some things as being beyond the domain of "conciliation." These are the things that can only be effectually disposed of by fighting for them.

It was generally felt that Sir Edward Fry would have to try the men first. He did so, and discovered that the only organized body he had to deal with—the Provisional Committee—were divided among themselves, and did not know what they really wanted. "Though between nine and ten "months had elapsed between the giving of the notice to "determine the agreement of 1892 and the meeting between "the masters and men on July 16, the Provisional Committee "had arrived at no figures with regard to the sliding-scale "or the minimum [wage] which they could place before the "employers." Again, the Committee had not asked for an arbitrator—they knew the masters would not consent to it; and yet when the Committee met the masters in conference on the 16th of July, this was the demand they put forward. As Sir Edward Fry is fain to state, this was "a course of "procedure which was certain to wreck the negotiations, "and was therefore a grave tactical error." Lastly, at the men's own meeting on July 25, the existence of a hopeless division of counsels among them was revealed. As the "Daily News" very truly observes, "it is deplorable "that a great struggle should have been begun with such "inadequate preparation, and be continued in such a ram-"shackle way."

Meanwhile, the consequential mischief and suffering traceable to the strike are terrible to contemplate. The colliers themselves are not so badly off. They are living in the masters' cottages without paying rent, helping themselves to the masters' coal, and getting what they can out of the shopkeepers and the strike funds. They have some soup kitchens; and they had stoneyards, but these are closed. The unhappy dockers who live by handling the coal that has ceased to come to be shipped—even the shareholders of the Great Western Railway Company, who have lately suffered a serious diminution of dividend—are waiting and wondering how much longer the trouble is going to last. Until November, the experts say; and then work will be resumed upon the masters' terms.

The Discoverer of Coal Gas.—A paragraph has recently appeared in several Continental journals to the effect that coal gas is now supposed to have been discovered by a Belgian, a Monsieur J. P. Minkelers, who was Professor at the University of Lowen. It is said that the first air-balloon was filled with hydrogen in 1783; and that a year later, Minkelers published a report in which he stated that the hydrogen might be replaced by coal gas. On Nov. 21, 1784, he is reported to have exhibited the ascent of a balloon charged with coal gas. In the course of his report on the use of coal gas in place of hydrogen for filling balloons, Minkelers is said to have made the observation that the coal gas might also be purified with lime-water and used for illuminating purposes.

WATER AND SANITARY AFFAIRS.

In taking a review of the legislation of the past session as affecting the water supply, and limiting our present remarks to that which concerns the Metropolis, we observe that two measures of importance have thus been dealt with by Parliament. One of these measures was the Southwark and Vauxhall Water Bill, which was to authorize the existing Company to construct additional works, in order to secure an adequate supply of water from the Thames. The demands of London had outgrown the narrow limits that Parliament had set to the operations of the Company; and it had been found absolutely necessary to draw more water from the river than the Legislature had sanctioned. In the session of 1896 a kind of provisional licence had been given to the Company, by which they were enabled to meet the requirements of their district for the time being, on condition that they introduced a Bill in 1898 by which a permanent arrangement should be established. When the question came before Parliament in the session which has just expired, the London County Council sought to make the new arrangement as temporary as possible. They urged that no attempt at a practical settlement of the question should be made until the Royal Commission on the Metropolitan Water Supply had presented their report. But the necessity which beset the Company was clearly discerned by the Select Committee of the House of Commons by whom the Bill was investigated; and the preamble was declared proved, subject to a proviso that if the undertaking were purchased within ten years no additional value should accrue, except in respect of actual capital expenditure. In this form the Bill ultimately passed through both Houses, and became law; power being given to raise the requisite capital by means of debenture stock.

The other measure materially affecting the Metropolis in the matter of its water supply was the Staines Reservoirs Joint Committee Bill, by which it was proposed to enlarge two reservoirs authorized by Parliament in 1896. Other works were projected; and in order to carry out the objects of the Bill, power was sought to raise a quarter of a million of debenture stock in addition to the million previously authorized. It was explained by Mr. Walter Hunter, the Engineer to the Joint Committee, that the authorized reservoirs were constructed to hold some 2500 million gallons of water; but that it was now proposed to increase the storage capacity by 1800 million gallons. Yet the promoters asked for no further powers to take water from the Thames. The estimated cost of the increased storage was £93,000. One-third more storage was to be obtained for an increase in cost of only 12 per cent. They were adding 60 acres to the size of the reservoirs. The Bill was quickly approved by the Select Committee of the House of Commons to whom it had been referred. The preamble was passed, on conditions which presented no difficulty; and the clauses were settled at the same sitting. Subsequently the Bill passed the House of Lords.

We find the Chairman of the London County Council, in his annual address recently delivered, expressing regret that the Southwark and Vauxhall Water Company had not observed a "truce," and refrained from gaining power to enlarge their rights of drawing water from the Thames. Whatever regret the Council may entertain, the people of South London are to be congratulated on the protection thus afforded them against what is called a "water famine." For this protection the Metropolis is in nowise indebted to the County Council. This body has sought to restrict the development of the present resources, and keeps steadily in view those conditions which may favour the early purchase of the undertakings of the Water Companies. So far as the London Water Question is concerned, the one object of the Council is to secure possession of the undertakings, independently of any considerations as to the interests and welfare of the consumers; it being assumed that all will be right, if only the authority of the Council is rendered paramount.

A restriction in the water supply of East London commencing yesterday gives rise to a considerable amount of excitement in the district affected; but it is the result of a reasonable degree of precaution on the part of the Water Company. Notice was given on Thursday evening that on the ensuing Monday the constant service would for the present be superseded by an intermittent supply, in which the water would be turned on for two periods of three hours each per day. A supply for six hours every day is

quite equal to that which is given where an intermittent service is the rule and not the exception. The abolition of the house cistern which so generally prevails among the working-class dwellings in East London renders anything short of a constant service a source of inconvenience, and occasions an outcry as of a "water famine," although the actual quantity of water sent into the district is adequate for all ordinary purposes. The advice given by Mr. I. A. Crookenden, the Company's Secretary, that consumers should fill "any available vessels" while the water is on, implies that a fair supply will be obtainable where means of storage are employed. Mr. W. B. Bryan, the Company's Engineer, signifies that the restriction will still allow a supply of 25 gallons per head daily. This is a long way short of a "famine," though its adequacy may depend upon reasonable care on the part of the consumers in the avoidance of waste. That there should be need for economy in the use of water during the present season ought to be no matter of surprise. Mr. Bryan has put the case very clearly—proving the actual existence of an extraordinary drought. This is not a mere plea in defence of the Water Company, but is in thorough agreement with independent testimony. Sir William Crookes and Professor Dewar, in their report on the London Water Supply for the month of July, say they have to record for that month "a very serious deficiency in the rainfall at "Oxford," making the total shortcoming for the year as much as 5·49 inches. Mr. Bryan speaks of a deficiency of 6 inches, and states that the present drought is the worst he has experienced for many years—corresponding to the fact that the flow in the River Lea is now less than had ever before been recorded. In little more than a year, up to Friday last, the rainfall in the Lea Valley has been deficient to the extent of about 9 inches.

In the face of facts like these, there is something eminently absurd in the agitation which is being raised in Hackney respecting Mr. Crookenden's notification. With regard to the restriction of the supply, a feeling is said to exist that Parliament (we presume the Government is intended) should be asked to take immediate steps to avert the possible danger. If Mr. Chaplin could bring down rain from heaven it would be of little service just now. The mischief arises from the deficient rainfall of the past; and summer rains will not alter the present situation. We have to go back in the history of this question. A year was lost when the Bill of the East London Company was rejected by the House of Commons, under County Council influence, in 1893. The works then proposed were not sanctioned until 1894, and were finished about a year ago. Last year parliamentary power was obtained to construct yet further works; and if these were now in existence, a large addition could be made to the daily supply. It is argued that it is no use to dig big holes if there is no water to fill them. The answer to this is that the big holes can be filled if they are made in due time; and the larger the stock of water, the longer it will last. The Company have been hampered and hindered, or the necessary works would have been constructed earlier, and the present crisis might never have occurred. The talk about uniting the mains of the various Companies is superfluous. The East London Company sought and obtained power last year to enter into agreements with other Companies for supplies of water; and they are now actually receiving a supplemental portion from the New River Company. The present restriction in the quantity distributed is mainly a matter of precaution on the part of the East London Company. They might possibly continue the constant service, and by the setting in of a wet season escape disaster. But they have prudently declined the risk. The Act of 1894 has operated advantageously, for if the works then authorized had not been completed, the present restriction must have been introduced much earlier. London, moreover, is not peculiar in finding the water supply running short. At least three weeks ago the Bradford Corporation gave notice that the night supply would be cut off until the reservoirs were replenished. Other towns are in a similar dilemma; and there is nothing to show that Local Authorities are more fortunate than Water Companies. The institution of a constant service, and the abolition of house cisterns, create a state of affairs which peculiarly affects the supply in seasons of drought. A cessation of the supply for a few hours in the course of the day at once produces an outcry, whereas under the intermittent system the period during which the water is on may be reduced without exciting attention. The waste under the constant system is a serious question; and, on the whole, there is much to be said in favour of the old order of things. We think it may be safely averred that the constant service, as compared with the intermittent, demands larger reservoirs and increased capital outlay. Withal there is the risk of occasional interruption, ensuing in a popular agitation. It may be remembered that houses which had the benefit of house cisterns or tanks suffered no deficiency of water when on former occasions the constant service in East London had to give place to a supply that was intermittent, or, in other words, restricted.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 441.)

THE prevailing idea in the Stock Exchange last week was that it was too hot to work, especially as most people were away at play. Besides this, as soon as it was known that the Exchange would be closed on Saturday, another influence to repress activity came into action. There was no startling feature in evidence at any time. Anxiety regarding things in China was allowed to sleep awhile; though Consols had a slight fall on Thursday. But the conclusion of terms of peace between the United States and Spain had the effect of booming the former's securities and depressing those of the loser. In the Money Market, the feature is still the unprecedented abundance seeking employment. The excess of supply over demand was probably never greater, if as great. In the Gas Market, business could scarcely be much lighter, especially on one or two days of the week. The chief features were that Gaslight issues seemed in better favour; and both the "A" and the "H" made a little advance in their quotations. South Metropolitan, on the other hand, was for some reason disposed to recede; and both the ordinary and the debenture betrayed a tendency to weakness. Commercials made no sign. Next to nothing was done in the Suburban and Provincial group; and quotations did not move. The Continental Companies were no busier than the rest; and the chief undertakings were without feature. But Cagliari and Tuscan receded a point each. Among the remoter Companies, Melbourne 5 per cent. bonds advanced. Business in the Water Companies was very restricted; but the general tone was quite favourable. West Middlesex had a fair advance; and Kent new shares gained a couple of points, though they get no advantage from the improved dividend.

The daily operations were: The market opened on Monday with a little promise of more activity; but it did not come to much. Hardly anything was dealt in but Gaslight "A" and South Metropolitan; and Gas quotations did not move. In Water, West Middlesex rose 1. Tuesday fell very calm, except for a few dealings in Imperial Continental. Gaslight "A" rose 2; but South Metropolitan and Tuscan fell 1 each. On Wednesday, there was nothing particularly observable; but a tendency to ease in South Metropolitans of both issues. Gaslights were firm; and the "H" advanced 1. Melbourne 5 per cent. bonds also rose 1. West Middlesex Water improved 2. Thursday's business consisted of one single bargain in Gaslight "A." Cagliari fell 1. In Water, Kent new rose 2. Friday's business was of the smallest; but the tendency was good, and Gaslight "A" rose 1.

ELECTRIC LIGHTING MEMORANDA.

Electricians' Smoky Chimneys—A Case at the Marylebone Police Court—A Word for Coke—The Teaching of Frederick Siemens.

GAS engineers would be more than human if they did not chuckle quietly over the newspaper reports of the prosecutions and finings of electric light companies in London, for creating a nuisance by their smoky chimneys. These proceedings have taken place before several Metropolitan Police Magistrates, whose individual methods of dealing with the cases make interesting reading. The law is, of course, always the same; and the offence is likewise the same. But the temperaments of the administrators of the law come out in their judgments, which are always different. Naturally, these decisions do not please the partisans of electric lighting. The comments of the electrical press upon the punishments magisterially meted out to the companies remind one of the classical yarn about the boatswain's mate who could never please the man he was flogging, whether he hit high or low. The prosecutions have served to emphasize the fundamental characteristic of a statutory undertaking, which was also disclosed in the recent gasholder litigation of the Sutton, Southcoates, and Drypool Gas Company. As with gas companies, so with electric lighting undertakers; they have a statutory right to carry on their business, but not to ride rough-shod over the rights of others at their own good pleasure. The first line of defence usually taken up by an electric lighting company prosecuted for committing a nuisance

by allowing their factory chimney to smoke, is that they cannot help themselves, because they are unable to procure the Welsh smokeless coal which they have been in the habit of using without reproach. This plea is not likely to be advanced again, after the summary way in which Mr. Curtis Bennett dismissed it at Marylebone Police Court the other day.

The case in question was that of the Metropolitan Electric Supply Company, who were prosecuted by the Paddington Vestry, not for the first time, for emitting black smoke from the chimney of their Amberley Street Station. The customary excuse of necessity was offered, but not accepted. The Magistrate allowed that the Company were bound to generate electricity at their station; but he found that they were equally bound to construct their furnaces "in the best-known way, and under the best-known scientific principles," which they had not done. Ordered, that the nuisance should be abated within nine months—this being the time supposed to be required for making the necessary structural alterations to the boiler plant. Costs to the prosecuting Vestry. In the course of the hearing, the Magistrate inquired tentatively why the energy could not be produced at the station by means of gas-engines, to which the reply was given that it would be absolutely impossible. This question terribly galled one of our electrical contemporaries, which declared, in commenting upon the case, that "it is simply maddening to listen to the unpractical babble of technically unlettered Counsel upon engineering subjects." It appears, however, that somebody else must have "babbled" as artlessly or artfully, with less justification, because the Company asked for time to build a chimney for each boiler, if they were expected to burn bituminous coal smokelessly. Hereupon our contemporary remarks that it does not understand the allusion to the separate chimneys, and charitably supposes that the witness "must have been misreported." Inasmuch as the Court allowed the time asked for expressly in order that the chimneys should be built, the natural inference is that the report of what the witness said is correct, and that it prevailed with the Magistrate. Nevertheless, of course, the contention is an absurdity.

It is to be noted that the leading electrical journals do not try to exonerate the electric lighting companies from blame for having been content to avoid smoke prosecutions by the cheap and easy expedient—from the engineering standpoint—of only burning smokeless Welsh coal in their boiler furnaces. Sir James Vaughan was so persuaded upon one occasion that the companies could avoid making smoke if they chose, that he ordered the defendants to abate the nuisance within a week. In the opinion of the "Electrician," this sharp order was absurd; seeing that "Welsh coal is practically unobtainable in London." But our estimable contemporary may be reminded that there is such a fuel as coke to be had in London at a reasonable price. There is no other reason than custom, that we know of, why steam engineers should not burn coke instead of even Welsh coal. It is simply that the engineers have never been taught to use coke, and would almost as soon think of burning flint stones or brickbats. Even granting that coke is not so strong a fuel as anthracite, it only means for a big station the keeping of an additional boiler under fire.

We agree with our electrical contemporaries in the main, that it will be a blessing in disguise if the Magistrates open the eyes of the central station engineers to the fact that their bad stoking practice should no longer be concealed by the expedient of using nothing but smokeless Welsh coal. They have taken to the Babcock and Wilcox boiler because the Americans used it before them, regardless of the facts that as usually set it is wasteful of fuel, and a hopeless smoker with anything but smokeless coal. Even where the much better Lancashire boiler is used, its furnace is too often improperly constructed, and the boiler is spoilt "through the desire of boiler makers to sell cross tubes at 40s. each, by having water-pipes put across the flue-tubes behind the bridge to effectually knock out any life from the struggling flames which burn past the bridge." There is no saving in what is called "burning one's own smoke;" because the thickest black smoke has nothing in it to burn. But though smoke is not worth much as a fuel, the proper burning of bituminous coal in a furnace is an economical proceeding. This the electrical engineers seem to have yet to learn. Frederick Siemens expounded the philosophy of burning flaming fuels many years ago; but his has been as a voice crying in the wilderness. Meanwhile, let us repeat that if there is no Welsh coal in London, there is coke to be had for present use, while the central station engineers are engaged in studying the means of adapting their boiler furnaces to burn bituminous coal without creating an offence.

The Semet-Solvay System of Coke Production has taken a firm foothold in the United States; there being in operation 25 ovens at Syracuse (N.Y.), 25 at Sharon (Pa.), and 50 at Dunbar (Pa.). There are in course of erection, 120 ovens at Birmingham, (Ala.), 120 at Wheeling (W. Va.), and 10 at Halifax (N.S.). In reality, the Solvay Company have been the pioneers of this industry in the United States. The first ovens of the kind were built in 1892; and after a year's trial their number has increased to the present figures. The 350 Semet-Solvay ovens now in operation are equal to the production of 1400 tons of coke per day, only one-fiftysecond part of the capacity of the various existing beehive ovens.

A SOBER ACCOUNT OF ACETYLENE.*

ACETYLENE appears to have possessed in very marked fashion the power of fascinating and distracting those who have essayed to speak or write about it. Lecturers and writers on scientific subjects whose evidence is usually absolutely trustworthy, have been led, as by mesmeric influence, to assign to acetylene virtues and potentialities to which it has no just claim. It has proved a tempting bait to the man who persistently spends his time and money on inventions, and has brought large sums to the Patent Office and to the pockets of patent agents. Small wonder is it therefore, that those who have taken up the manufacture of calcium carbide or of acetylene generators have drawn too glowing pictures of the new illuminant. The licence granted by common consent to a vendor to extol his wares by ascribing to them greater merit than they possess, exempts the manufacturers from severe blame. The lecturer and the writer have not the same excuse to plead; and exaggeration and extenuation should be strenuously avoided by them; for the public looks to such men for impartial verdicts. The discovery of the electrical process for the production of carbide of calcium was fraught with immense possibilities; and a hasty consideration of them upset the equipoise of many minds. Random words were uttered, of which the speakers are now for the most part ashamed. There has elapsed since that period more than enough time for forming a calm and dispassionate opinion on the qualities and uses of acetylene. Yet authors of pamphlets and treatises still seem blinded to its limitations and faults by the mere brilliancy of its flame, and the facility with which it can be produced. We have always deprecated the manner in which nearly all who have had to do with acetylene have attempted to give it more than its due meed of praise; and we have not hesitated to stigmatize as evil counsellors the worst offenders. It is therefore gratifying to be able to say that we have at last before us a treatise which appears to present a strictly sober view of acetylene.

Mr. Gibbs is not reticent concerning the dangers of acetylene; but he quickly disposes of those which are imaginary or avoidable. He anticipates that the intensely bright light of acetylene will make it the object of complaints that it "hurts the eyes;" and those who have watched the advent of the incandescent gas light will not be surprised to see his anticipation realized. But as people cease to regard a light as a novelty, and to gaze directly at it, complaints of this description die out; and Mr. Gibbs has no fear but that the charge will eventually be dismissed as non-proven in the case of acetylene also. He admits, however, that the flame, owing to its small size, casts a sharp shadow, and is unpleasant without a diffusing globe or shade. Visitors to the Acetylene Exhibition at the Imperial Institute have had ample opportunities of comparing the effects of the light with and without diffusive globes; and they will bear out the view that globes are most desirable adjuncts.

In Mr. Gibbs's descriptions of electric furnaces for producing the carbide we find no novelty, until we come to an account of a continuous electric furnace invented by Mr. C. Bradley, of New York. This furnace we are told "seems to satisfy perfectly the conditions of uninterrupted carbide production;" but the description given is derived from the patent specification, and we do not learn that the furnace has actually been used. In the course of some remarks as to the generation of acetylene, the following strange sentence occurs: "When calcic carbide and water are brought together, the calcium decomposes the water in order to unite with its oxygen, for which it has an affinity; while the carbon and hydrogen liberated by the reaction, finding nothing else on which they can seize, unite to form acetylene." How the calcium and carbon have become liberated from their combination, does not appear; and the proffered explanation, as it stands, is sheer nonsense. In several cases we observe that Mr. Gibbs is very weak on questions of chemistry. It is only for sound common-sense and the results of practical experience that his treatise is valuable. It attempts to give very few scientific data or explanations; and those it furnishes are not always reliable. The impurities of carbide, and the purification of acetylene, are not dealt with systematically. Mr. Gibbs apparently thinks that carbide—in America, at least—is now uniformly of good quality, and that it is better to avoid the necessity for purification by generating the gas in such a manner that impurities are as far as possible retained in the generator, than to elaborate schemes for the purification of the gas. The descriptions of numerous generators are very good, though in many cases they savour strongly of the patent specifications. Portable lamps have admittedly been so far rather unsuccessful; and we agree with Mr. Gibbs that "the best acetylene lamps are troublesome to manage," and that "they require a greater degree of intelligence for their successful handling than do the ordinary oil-lamps." The burners invented by Mr. E. J. Dolan, which are of the air-injector type, are considered the most suitable of those so far devised. Mr. Gibbs favours generators in which carbide is added to water; and he has devoted much time to experiments aimed at the production of a satisfactory machine of this type. He describes many of his researches, which, however, are not yet completed.

A list of all the United States patents for calcium carbide and

* "Lighting by Acetylene. Generators, Burners, and Electric Furnaces." By William E. Gibbs, M.E. New York: D. Van Nostrand Company. London: Crosby Lockwood and Son. 1898.

acetylene apparatus is given; and a study of it reveals the curious fact that the type of generator in which small charges of carbide are dropped into a large quantity of water has been virtually ignored by the inventors, though this style is favoured by French and German experts, and has certain undeniable advantages. It will be remembered by visitors to the Acetylene Exhibition at the Imperial Institute, that this type of generator was represented at one or two stands only. Mr. Gibbs thinks that manufacturers have passed it over because it does not lend itself to production at a very low price; and in the stress of competition they find it more remunerative to make cheap and unreliable generators, and leave the public to learn by bitter experience how dear ultimately the initial cheapness will prove. From the many true sayings in the treatise before us, we will quote one which presents a reason why acetylene fascinates until one of its objectionable features stands out and disillusions the victim: "Acetylene is, until 'something happens,' a substance so easily managed, so capable of control, and apparently so unlikely to manifest its latent affinities, that the vigilance of the experimenter becomes relaxed." In other words, acetylene is a dangerous plaything, and a snare to the unwary experimentalist. In capable hands it is a useful illuminating agent; and those who desire to learn something of its potentialities and limitations may do far worse than refer to Mr. Gibbs's treatise, which we have read with a considerable amount of pleasure.

RATES OF WAGES AND HOURS OF LABOUR.

THE echoes of the great strike in the engineering trade continue to reverberate in the hollow corners of the industrial world. Last week a London newspaper went so far as to blame those who brought down upon themselves this overwhelming defeat, for the stiffness manifested by the Welsh coalowners in respect to their own labour trouble. A short time since a leading technical journal gave publicity to the statement that several of the London firms who had, under pressure, conceded the eight-hour day had gone back to the old system, the A.S.E. sombrely acquiescing in the reversion. Our contemporary demanded that the firms who had taken this step should confess it as publicly as their submission to the eight-hour demand was advertised at the time. Strict justice, doubtless, requires recantation to be performed as openly as the original profession was signalized. But this particular matter of the working day is, after all, more a question of business than of sentiment; and one cannot blame commercial people for keeping the details of their business to themselves. If it is true, however, that the eight-hour day, or forty-eight hour week, is vanishing from the London shops, one would like to have the fact officially confirmed.

Just at this moment, when it is in question whether the disastrous engineering strike did not set the eight-hour day back instead of bringing it on faster, Mr. H. Llewellyn Smith, the Commissioner for Labour, publishes his fifth annual report on "Changes in Rates of Wages and Hours of Labour in the United Kingdom." This report deals with the changes that took place in 1897, which is characterized as a year of rising wages. It is officially computed that the net result of all the changes recorded was a rise of about £45,000 a week; the greater part going to the engineering and shipbuilding, mining, and building industries. It is observed that rates of wages change much more slowly than earnings. When rates of wages change, as a rule only a small porportion of workpeople feel the difference in any one year. The case of coal miners is exceptional, as among them the influence of a change of the rate of pay is felt at once by a large number, and quickly spreads. Leaving the miners out, the somewhat surprising result appears that for all trades and occupations together, "the vast majority of the wage-earning population are unaffected by any changes in rates of wages during any given year." The years 1894 and 1895 were years of falling wages. The next two years show a continued rise—especially 1897. Last year was also marked by reductions of the hours of labour, generally without any corresponding decrease in weekly wages, and sometimes accompanied by actual increases in the rates. The engineering strike for the eight-hour day is only mentioned in passing. It is stated that, though reductions took place at a number of works, these were "mostly temporary, the longer hours being reverted to at the conclusion of the dispute early in 1898." Such temporary reductions are not included in the statistics of the Labour Department.

It is always an interesting question how changes in rates of wages are brought about. This report can be quoted to prove that, while conciliation boards, mediation, arbitration, and strikes bulk largely in the newspapers, in Parliament, and on political platforms, as means of adjusting the relations between Capital and Labour, none of these things is of much account in reality. "Mutual arrangement between the parties directly concerned was, as usual, the principal method by which changes in wages and hours of labour were settled." The wages settlements under twelve of the eighteen sliding-scales known to be in operation in 1897, affected 23 per cent. of the workpeople included in the returns. All the other machinery, which makes so much fuss in the world, arranged the affairs of 2½ per cent. of the total. The remainder, forming nearly 75 per cent. of the total, "had their wages altered by personal negotiation or arrangement between the employers and the workpeople or their representatives." A further point brought out is the very large number of changes, both of rates of wages and hours of labour, that took place without anything that could be called a labour dispute. So clear an illustration of the passing out of fashion of the great "strike policy" is worth noting. It shows, among other things, that those Labour leaders who lost the opportunity of foisting themselves into public positions offered by the cropping up of the New Trade Unionism in 1889, have little prospect now of doing anything in the same line. Nor is the independent "Conciliator" in much greater demand.

It is remarkable how widespread are the effects of good and bad years. When wages are going up, everybody, speaking generally, participates in the advance. Thus in the year 1897 only 13,855 persons are reported to have had their wages reduced, as compared with 560,707 who received increases. Again, the building trades are conspicuous for the steady advance in wages extending over several years; while employment in these trades has been plentiful all along. Moreover, wages have risen all over the country. Those who may yet entertain a lingering belief that militant Trade Unionism, with its paraphernalia of brass bands and banners, and its vociferous leaders, is necessary for the improvement of the circumstances of the working man, may be commended to that part of the report which deals with Seamen and Firemen. It is hardly necessary to recall memories of the calamitous mess that the Seamen and Firemen's Union made of itself and its cause; yet last year, Union or no Union, "the general tendency of wages . . . . was decidedly in an upward direction." The same with agricultural labour: "In England and Wales there was an upward movement in wages in 1897 compared with 1896."

Respecting the eight-hour day, the report states that "during 1897 the number of workpeople employed in private establishments who secured the adoption of the eight-hour day was unusually large, and more than equalled the total number for the previous four years. On the other hand, the number of employees of public authorities whose hours were reduced to eight per day during the year was small." The actual figures, however, are not very large. "In all, 5896 workpeople employed in private establishments, and 200 employees of public authorities, secured an eight-hour day for a six-day week; while 5036 employed in private establishments, and 302 employed by public authorities, secured an eight-hour day for a week of seven days. Against these totals must be set 300 men who reverted from eight hours per day to longer hours." It is well to have the actual numbers to go by in contemplating the course of a "cause" which is so much talked about. What do the figures show in this connection? It is explained that "the substitution of three shifts of eight hours for two of twelve hours among the blast furnacemen of Cleveland affected about 5000 persons, whose hours were thus reduced from 84 to 56 per week." This accounts for nearly one-half of the workpeople listed as having "secured the adoption of the eight-hour day." But it is misleading to make this confusion between an eight hour-shift, and an eight-hour working day. We argued this point out at the time of the more general adoption of the eight-hour shift in gas-works; showing that the question of the division of a continuous process of manufacture into "watches" of shorter or longer duration differs altogether from that of the length of the working day of an industrial establishment. Besides the Cleveland men, the most important example in the same line is "the case of 2830 employees in gas-works in London, from a week of 54 to a week of 48 hours." This means the mechanics and tradesmen in the employ of The Gaslight and Coke Company, who obtained the 48-hour week for the asking at the time of the engineering strike. It is rather strange that the Directors of the Company have never taken credit publicly for making this concession to the forces of Trade Unionism. If these two groups of workpeople are eliminated, the number of those who, in the language of the report, "secured the adoption of the eight-hour day," was not so large after all.

The bulk of the report is made up of detailed tables, which afford a mass of general information. Several examples of increases of the wages of gas workers, and decreases of their working hours, are included in these tables; and not one of the reverse process. On the whole, while the report conveys the pleasing impression that the trade of the country is good, and that the workpeople are obtaining a share of the benefit flowing from this general activity of enterprise and labour, it does not support the idea that Trade Unionism is to be credited with having anything to do with the promotion of so satisfactory a state of things. The one cause with which Trade Unionism has been most prominently identified during the year under review—the movement for the eight-hour day—has certainly not progressed in the degree claimed by Mr. Llewellyn Smith. What the partisans of the movement would like to see is evidence that it has some "way" of its own, however small, and does not merely exist as a concession "secured" by one party in the labour world against the wish of the other. Capital is not bound to any particular length of working day. The numerous and influential body of managers, foremen, draughtsmen, and clerks would be only too glad to see the working week

shortened, if the output were the same. It is the latter point that governs the question. The advocates of the eight-hour day have always rested their case on the plea that men can turn out as much of all kinds of work—say, engineering—in eight hours as in nine. Mr. Barnes, the Secretary of the A.S.E., used during the strike to talk at large about the physiological laws that forbade a London fitter to look at his lathe for longer than eight hours a day—without overtime. But all that has gone by for the time being. We would not say, however, that the advent of the day of eight hours, as of other improvements of the mechanic's lot, was not hastened rather than delayed by the recent reverse of the "stand-and-deliver" policy of the A.S.E. So long as the Society man fondly imagined he had only to ask and have, and need not scruple about returning bad service for good money, he would have been a bad hand to have about a works for a day of any length. Once convinced that wages must be earned as well as bargained for, the workman is more likely to get what can reasonably be granted in the way of shortened hours of labour than he will ever be able to command by virtue of organization only.

PERSONAL.

Mr. WALTER JONES has secured the appointment of Secretary of the Southminster Gas Company.

Mr. F. GOLDSWORTHY has been appointed Resident Manager at the Streatham works of the Southwark and Vauxhall Water Company.

Mr. CORBET WOODALL has resigned his position as a Director of the Waltham Abbey and Cheshunt Gas Company, and has been succeeded by Mr. HENRY WOODALL. There has also been a re-arrangement of the official work; Mr. H. GOUGH having, by arrangement, retired from the secretaryship, the duties of which will henceforth be discharged by the Manager, Mr. W. BINCE RANDALL.

An interesting ceremony took place at the Bombay Gas-Works on the 31st ult., when the General Foreman, Mr. G. F. Cutting, on behalf of the men, presented a very handsome silver bowl on stand (Deccan work) to Mr. LOUIS PENNY, M.Inst.C.E., on his retirement from the position of Engineer of the Company. In a few well-chosen words, Mr. Penny acknowledged the presentation, and begged the men to give to his successor, Mr. F. W. Chamberlain, the hearty support they had from the very first accorded to himself.

Last Thursday evening, the men employed at the Halifax Gas-Works met at the offices for the purpose of presenting to Mr. A. J. HOPE, Assistant to Mr. T. Holgate, a gold chronograph watch, subscribed for by 213 men on the works, and a travelling-bag, on his leaving to take up the position of Superintendent of the Effingham Street works of the Sheffield Gas Company. The presents bore suitable inscriptions. Mr. Holgate, in making the presentation, referred to the abilities Mr. Hope had displayed in his work during his eight years' stay at Halifax. Mr. Hope thanked his fellow-workers for their appreciation of his endeavours to discharge his duties satisfactorily.

Manchester District Institution of Gas Engineers.—The 115th quarterly meeting of the Institution will be held on Saturday, at Warrington, the home of the President for the year—Mr. W. S. Haddock. According to the programme issued by the Hon. Secretary (Mr. S. S. Mellor, of Northwich) the members will arrive in the town shortly before eleven o'clock, and will first inspect the Longford Gas-Works of the Corporation, where light refreshments will be provided. After the inspection, the members will be entertained to luncheon by the Gas Committee. In the afternoon, there will be a drive to Knutsford, *viâ* Arley; the pleasure of the trip being enhanced by the fact that Colonel Piers Egerton-Warburton, of Arley Hall, has given permission for the coaches to go through his private park. Tea will be taken at the Royal George Hotel, Knutsford, after which the only business on the *agenda*—consisting of the confirmation of the minutes of the previous meeting and the admission of two new members—will be transacted.

Acetylene Black.—Reference has already been made in the "JOURNAL" to the granting of a patent to a French inventor in connection with the above matter. The inventor in question is M. Hubon. When acetylene gas is burned with a smoking flame, three to four times as large a quantity of soot is obtained as from the same quantity of mineral oil. The acetylene soot is very light, and exhibits an absolutely black colour without any tinge of brown. Besides, all tarry admixtures and other substances contained in lamp black, &c., are absent from the soot. It is very bulky, and will be specially adapted for Indian ink, as well as for colours used in printing and lithography. The patentee gives three methods for the production of the colour. According to the first, the acetylene gas is kept in a steel cylinder under two atmospheres pressure, and is then ignited through an electric spark or a glowing platinum wire by way of explosion. The final pressure of the resulting hydrogen does not exceed 12 atmospheres; so that the danger of an explosion is excluded if steel cylinders of corresponding strength are employed. This method has the advantage that the theoretic yield of carbon is obtained from the acetylene; the product being of the greatest purity.

NOTES.

The Working of Gas-Engines.

At the present time, the Beau de Rochas cycle of operations is the one almost exclusively employed for gas-engines. There are, however, certain inconveniences in its application to motors operated by poor gases, or those obtained from blast-furnaces, from the point of view ofregulating the working and clearing the cylinder after explosion. According to "La Nature," a French engineer—Mons. E. Heirmann—has devised a new cycle of operations which will remedy these inconveniences, and impart to the motor all the advantages resulting from working with variable explosion. To realize these conditions, he introduces the mixture of air and gas under pressure into the cylinder, interrupts the admission under constant pressure at a fixed point, varied as required by means of suitable devices, and obtains simultaneously ignition of the mixture, which thus produces the working force as far as the end of the piston stroke. During the return stroke, the products of combustion are completely expelled. Besides perfect clearance of the cylinder, there are two other equally appreciable advantages—an explosion for each revolution of the shaft, and a variable admission as for steam motors.

The Proper Use of Safety-Lamps.

The use of incandescent electric lamps for coal mines, and for "safety" lamps intended to be employed in enclosed places where accumulations of explosive gases might be expected, has been considered by Mr. H. W. Halbaum, in a series of papers published in the "Colliery Guardian." The writer pronounces against the practice, for a variety of cogent reasons. First, and mainly, it is laid down that the purpose of the old make of miners' safety-lamp, with a flame burning inside a wire gauze casing, was not that of enabling a man to remain in a dangerous atmosphere for an indefinite period without being made aware of the fact. The flame of the lamp, indeed, could not ignite the explosive atmosphere through the gauze; but the gas from without could penetrate to the inside of the lamp, and give the well-known indication of the state of things—thus warning the workman to look out for his own safety. This is the quality of "safety" which is needed in a lamp, quite as much as that of not igniting an explosive atmosphere which is found to exist. Thus merely carrying a good miner's safety-lamp of one of the accepted improved patterns into a dangerous atmosphere at once exhibits the fact that gas is present, which an electric lamp would not do until by some means it was accidentally broken, when it would give the first indication of danger by exploding the gaseous mixture.

Hints on Oils and Paints.

In some "Notes on Oils" published in the "Ironmonger," it is remarked that in the mixing of paint it is not always remembered that all the oil should go in first, the turpentine being added afterwards. A better result and more covering power will be obtained by following this rule than when the turpentine is put in first, or added before the whole of the oil has been used up. Turpentine may be kept from becoming cloudy or thick by the addition of a few small pieces of quick-lime. Vermilion being a useful preservative paint, as well as one greatly in demand for painting signals and other objects in works which are meant to catch the eye, a high price is paid for it with the intention of securing the pure article. This, however, is not always sufficient; the price of from 2s. 6d. to 3s. per pound being a great temptation to adulteration with red lead or even iron oxide. To test vermilion for purity, a small sample is to be placed in a fragment of hard porcelain, and heated over a gas-flame or spirit-lamp. If pure, it will evaporate almost completely, while any non-volatile admixture will, of course, remain. Our contemporary speaks a good word for yellow ochre as a most permanent pigment. It may be remarked, as a commentary upon these observations, that signs are not wanting of a revolt against the time-honoured monopoly of iron-oxide paint for structural ironwork in places where the work can be publicly seen. Engineers are paying much more attention to the decoration of ironwork by polychromatic painting than was formerly deemed necessary.

Sir W. Crookes on the Periodic Law.

There seems to be a lull for the time being in the announcements of "new" constituents of the air as being discovered by the followers of Rayleigh and Ramsay. Indeed, it is rumoured that one or two of the latest gains of science in this line have disappeared from human ken. Sir William Crookes has submitted to the Royal Society some suggestive observations on the difficulty that has been experienced in placing these newly-found elements in their proper niche in the scheme of arrangement of the elements which we owe to the ingenuity and scientific acumen of Newlands, Mendeléeff, and others. In order to facilitate this arrangement of the elements according to the periodic law, Sir W. Crookes has imagined them as ranged in space in a figure-of-eight spiral. The result is remarkably consistent. With regard to the new atmospheric elements, it is observed that until recently chemists knew no element which had not more or less marked chemical properties; but now, by the researches of Lord Rayleigh and Professor Ramsay, we are brought face to face with a group of bodies with apparently no chemical properties, and forming an exception to the other chemical elements.

Sir W. Crookes ventures to suggest that, in his proposed scheme, these elements—helium, argon, and krypton—naturally fall into their places. Helium comes between hydrogen and lithium; argon between chlorine and potassium; and krypton between bromine and rubidium. There are places for many more inert bodies, some of which, Sir W. Crookes suggests, will eventually be discovered in the solid form.

A Chemical Test for Carbonic Oxide in Air.

The difficulty of determining by chemical test the proportion of carbonic oxide present in the air at any time is well known. M. Gautier has been working out this problem of air analysis; and he now claims in the "Comptes Rendus" complete success for his method of absorption by hot copper of the iodine produced when the air containing carbonic oxide is passed over iodine pentoxide at 100° C. A sample of air (10 to 100 litres) is filtered through cotton wool or glass wool, passed over caustic potash in solution to absorb the carbon dioxide, and then over caustic baryta and phosphorous pentoxide. It then passes through two tubes containing respectively iodine pentoxide and finely-divided copper which has been reduced from the oxide by hydrogen at a low temperature, and allowed to cool in a current of carbon dioxide. These two tubes must be connected without india-rubber, are thoroughly dried in a current of hot air before being weighed, and are kept in an air-bath at 100° to 105° C. The increase in weight of the tube containing the copper gives the amount of iodine set free from the iodine pentoxide, whence the amount of the original carbon monoxide can be calculated. The method would not appear to be an easy one to practise; but it is claimed that experiments with known mixtures show that it is extremely accurate, and capable of detecting carbonic oxide in the proportion of 1-500,000th of the air. Experiments on the air of Paris gave amounts of carbon monoxide varying from zero to 9 parts per million. The air of the author's laboratory gave 12 parts per million. The presence of acetylene appears to qualify even this test; so that science seems to have no chemical means for the detection of carbonic oxide in air that would command the confidence of an English Court of Justice.

COMMUNICATED ARTICLE.

THE LOCAL GOVERNMENT BOARD AND THE PROTECTION OF WATER SUPPLIES FROM POLLUTION.

By Percy Griffith, Assoc.M.Inst.C.E., F.G.S., M.Inst.M.E.

(*Concluded from p.* 367.)

Having now summed up the existing state of affairs in regard to this important matter, it will be easier to suggest such modifications in the existing Acts of Parliament as would appear to be necessary in order to affect the object in view, which is *to provide some effectual safeguard against the supply of polluted water for public domestic use.* Now no parliamentary enactment is the slightest use that does not allow fully for practical difficulties and lend itself to general application. It will therefore be desirable to consider the matter from a purely practical standpoint. The essential points to be secured in any amendment of the law may be summarized under five heads—

1.—It is above everything necessary that means should be adopted whereby any pollution may be detected as soon as possible after its occurrence, and in any case before the water is allowed to flow from the works into the service mains or reservoirs.

2.—It is next essential that in the event of pollution being discovered at any works or in any one source of supply, this works or source of supply should at once be closed, and not used again for supplying the public until the cause of the pollution has been discovered and removed.

3.—Before these conditions can be made compulsory, some more or less definite basis must be arrived at as a definition of pure and impure water. This must include a clearly defined method of collecting and examining or testing samples of water, and should preferably stipulate certain conditions both as regards physical, chemical, and bacteriological constituents, which could be taken universally as sufficient to render any water unfit for domestic use.

4.—Rules must be laid down and made applicable to all water-works undertakings, whether owned by municipalities or private companies, requiring the regular inspection of all sources of supply, and the regular analysis and examination of the water at the point where it enters the water-works, and also (at less frequent intervals) at the outlet of consumers' services, by properly qualified and duly authorized officials, who must be as far as possible altogether independent of the authority owning the water-works.

5.—Powers must be given to such officials to compel the immediate closing or disconnection of any source of supply, works, or mains that may be found to contain polluted water; and legal power must be given to the local authority to enforce his orders in this respect, whether the works be in the hands of the local authority or otherwise.

In order to give effect to the above conditions, I would suggest that amendments be made to the existing Acts of Parliament on the following lines:—

Amendment of the Public Health Acts.

1.—Creating an official to be known as the "Water-Works Referee," who shall be appointed under sealed certificate by County Councils, subject to the approval of the Local Government Board, which approval should be endorsed on the certificate, and who shall be duly qualified to examine, test, and report upon sources of water supply and samples of water. These officers should in all cases be either qualified chemists or, better still, engineers of experience; and it would no doubt be necessary for most county councils to appoint more than one official, and allocate the county among them by dividing it into districts according to the number of referees appointed.

2.—Requiring such officials to inspect and examine *all water-works* within their district at intervals of not less than one month, and otherwise as circumstances might require; and to furnish reports to their respective county councils after each inspection, giving analyses and full particulars (physical, chemical, and bacteriological) of the water being supplied, also of the general condition of the source of supply and works. (The Local Government Board might issue forms and general instructions as to the manner of making these reports.)

3.—With respect to water-works in the hands of local authorities, the clauses amending the Water-Works Clauses Act (as suggested below) should be incorporated, with the exception of Nos. 3, 5, 6, and 7.

4.—Providing that, in the event of any local authority refusing to carry out the orders of the referee, it shall be the duty of that officer to report the fact to the county council, who shall issue an order requiring the local authority to obey such orders within a given time; and in the event of continued refusal of the local authority to comply with the terms of the order, the county council shall appoint some person or persons to close the works or part of same, and to carry out the alterations at the expense of the local authority, as per clause 299 of the Public Health Act, 1875, or clause 16 of the Local Government Act, 1894.

Public Health Act, 1875.

Power of Board to Enforce Performance of Duty by Defaulting Local Authority.

Sec. 299.—Where complaint is made to the Local Government Board that a local authority have made default in providing their district with sufficient sewers or in the maintenance of existing sewers or in providing their district with a supply of water in cases where danger arises to the health of the inhabitants from the insufficiency or unwholesomeness of the existing supply of water, and a proper supply can be got at a reasonable cost, or that a local authority have made default in enforcing any provisions in this Act which it is their duty to enforce, the Local Government Board, if satisfied, after due inquiry, that the authority have been guilty of the alleged default, shall make an order limiting a time for the performance of their duty in the matter of such complaint. If such duty is not performed by the time limited in the order, such order may be enforced by writ of mandamus, or the Local Government Board may appoint some person to perform such duty, and shall by order direct that the expenses of performing the same, together with a reasonable remuneration to the person appointed for superintending such performance and amounting to a sum specified in the order, together with the costs of the proceedings, shall be paid by the authority in default; and any order made for the payment of such expenses and costs may be removed into the Court of Queen's Bench and be enforced in the same manner as if the same were an order of such Court.

Any person appointed under this section to perform the duty of a defaulting local authority shall, in the performance and for the purposes of such duty, be invested with all the powers of such authority other than (save as hereinafter provided) the powers of levying rates; and the Local Government Board may from time to time by order change any person so appointed.

Sec. 305.—Whenever it becomes necessary for a local authority, or any of their officers, to enter, examine, or lay open, any lands or premises for the purpose of making plans, surveying, measuring, taking levels, making, keeping in repair, or examining works, ascertaining the course of sewers or drains or ascertaining or fixing boundaries, and the owner or occupier of such lands or premises refuses to permit the same to be entered upon, examined, or laid open, for the purposes as aforesaid or any of them, the local authority may, after written notice to such owner or occupier, apply to a Court of Summary Jurisdiction for an order authorizing the local authority to enter, examine, and lay open, the said lands and premises for the purposes aforesaid or any of them.

If no sufficient cause is shown against the application, the Court may make an order accordingly, and on such order being made the local authority or any of their officers may, at all reasonable times between the hours of nine in the forenoon and six in the afternoon, enter, examine, or lay open the lands or premises mentioned in such order for such of the said purposes as are therein specified, without being subject to any action or molestation for so doing: Provided that, except in the case of emergency, no entry shall be made, or works commenced under this section, unless at least twenty-four hours' notice of the intended entry and of the object thereof be given to the occupier of the premises intended to be entered.

Local Government Act, 1894.

Sec. 16.—(1) Where a parish council resolve that a rural district council ought to have provided the parish with sufficient sewers, or to have maintained existing sewers, or to have provided the parish with a supply of water, in cases where danger arises to the health of the inhabitants from the insufficiency or unwholesomeness of the existing supply of water, and a proper supply can be got at a reasonable cost, or to have enforced with regard to the parish any provisions of the Public Health Acts which it is their duty to enforce, and have failed so to do, or that they have failed to maintain and repair any highway in a good and

substantial manner, the parish council may complain to the county council; and the county council, if satisfied, after due inquiry, that the district council have so failed as respects the subject matter of the complaint, may resolve that the duties and powers of the district council for the purpose of the matter complained of shall be transferred to the county council, and they shall be transferred accordingly.

(2) Upon any complaint under this section, the county council may, instead of resolving that the duties and powers of the rural district council be transferred to them, make such an order as is mentioned in section 299 of the Public Health Act, 1875, and may appoint a person to perform the duty mentioned in the order; and upon such appointment, sections 299 to 302 of the Public Health Act, 1875, shall apply, with the substitution of the county council for the Local Government Board.

(3) Where a rural district council have determined to adopt plans for the sewerage or water supply of any contributory place within the district, they shall give notice thereof to the parish council of any parish for which the works are to be provided before any contract is entered into by them for the execution of the works.

AMENDMENT OF THE WATER-WORKS CLAUSES ACTS.

1.—Defining "pure and wholesome water" (section 35 of the Water-Works Clauses Act, 1847) to be water which shall, in the opinion of the water-works referee of the district in which the works are situated, be suitable for domestic use. (The Local Government Board should issue directions as to what conditions may be generally taken to render any water unfit for domestic use.)

2.—Providing for the admission of the water referee to the works of the undertakers at any time between the hours of 10 and 4, on giving six hours' notice in writing, and producing his certificate from the county council and the Local Government Board; and that facilities be given him for examining the sources of supply and works, and taking samples of the water at any part thereof.

3.—Providing penalties for refusal or obstruction.

4.—Giving power to the referee to order the immediate closing or disconnection of any part or the whole of any works, or the alteration thereof for the purpose of protecting the water from pollution.

5.—Providing penalties for refusal to obey same, and limit of time fixed for carrying out any alterations required under the order of the referee.

6.—Providing that in the event of a works or part of a works being closed by order of the referee, the undertakers shall be at liberty to appeal to the Court against the order; and in the event of it being proved that the order was uncalled for or unjustified by the circumstances of the case, the Court may order the payment of damages by the county council to the undertakers for any loss they may have sustained owing to the carrying out of such order, also the cost of the appeal to follow the result.

7.—Providing similar right of appeal against an order to alter the works.

TECHNICAL RECORD.

SOME NOTES ON THE MODERN COMMERCIAL GAS-ENGINE.

By W. CARMICHAEL PEEBLES, of Edinburgh.

[A Paper read before the North British Association of Gas Managers, July 28, 1898.]

When asked a few weeks ago to read a paper on gas-engines before the North British Association of Gas Managers, I must say I felt great misgivings as to the treatment of such a subject, owing to the short time at my disposal. The numerous papers and lectures which have from time to time been given to the public, through the medium of many learned societies and the press, also make it somewhat difficult to bring forward fresh points of interest. I must crave your indulgence, therefore, while I endeavour to engage your attention for a little on this subject, which is growing in importance day by day; for there can be no doubt that the gas-engine is becoming more and more recognized as a standard type of machine for the economical production of motive power. The simplicity of the modern gas-engine brings its management within the scope of individuals of ordinary intelligence, who may not even be connected with engineering matters; and the prejudice which at one time existed against it, and still may exist in the minds of a few, is being gradually overcome. That this is so is well shown by the enormous numbers now manufactured and in use all over the country.

In treating my subject, "Some Notes on the Modern Commercial Gas-Engine," I shall, in the first place, recall to your minds very briefly the history of the particular engine which, almost to the exclusion of all other types, holds the supreme position on the market at the present time. I allude to the "Otto cycle" gas-engine. One cannot but feel astonished, in looking over the patent records for the last thirty years, to see the extraordinary number of inventions—some of them, seemingly, of the greatest possible merit—which have failed when put to the hard test of practical work. The gas-engine patent records are no exception in this respect. Hundreds of patents, representing the work of a multitude of minds, have been laid on the shelf as useless, chiefly owing to the discovery of the "Otto cycle," which made the gas-engine a real success, and raised it to the proud position of being a competitor with the steam-engine.

The cycle of operations in the Otto engine was first suggested by a French scientist, Beau de Rochas, about the year 1862. At the same time he also pointed out the advantages of compressing the charge before firing. Compression, it is true, had been tried by Barnett in 1838; but the real advantage of it was not properly understood until Beau de Rochas came forward and stated, after much study and investigation, that the conditions necessary for economy in the gas-engine were: (1) The largest cylinder volume with the smallest cooling surface. (2) High piston speed, giving rapid expansion. (3) The greatest possible expansion. (4) The highest possible initial pressure before expansion.

The fact that these are the conditions aimed at by manufacturers to-day shows how well Beau de Rochas understood the true theory. He was, however, too soon with his discovery; and it lay latent for nearly 15 years, during which time little appears to have been done with his suggestions. This was, no doubt, owing to inventors trying to follow on the lines of the steam-engine; their endeavours being to produce a gas-engine either single or double acting.

The gas-engines then made were of several types—nearly all being atmospheric or non-compression, and giving an explosion at each outstroke of the piston. The most popular was the Otto and Langen, manufactured at Deutz, in Germany. Some of you may have seen these curious engines, with the rack connecting rod, gearing into a clutch pinion on the crank-shaft. On the upward movement of the piston, the pinion driven by the connecting-rod ran round free; but on the down-stroke the clutch engaged with the crank-shaft, giving it rotary motion. The explosion merely lifted the piston, which was of great weight, to the top of the cylinder, the latter being vertical. Advantage was then taken of the vacuum produced by the cooling gases, when the pressure of the atmosphere, assisted by the heavy piston, gave the power to drive the engine. The noise and vibration produced were very much against the engine; and its popularity was, no doubt, due to the low gas consumption—about 44 cubic feet per brake-horse-power per hour—compared with nearly double that quantity used by other engines then made.

While manufacturing the Otto and Langen engines, which were finally brought to a high pitch of perfection, Herr Otto seems to have continued experimenting; and experiments carefully conducted by an earnest worker are certain to bear fruit. He, no doubt, fully realized that the gas-engine had a great future before it, and was aware of the necessity of providing a system which would be more reliable, and less noisy, than that used in the Otto and Langen engine. The result of his work was the adoption of the cycle suggested by Beau de Rochas years before, and the production of the excellent Otto silent gas-engine. This engine was exhibited at the Paris Exhibition of 1878, and created quite a revolution in the gas-engine industry. Messrs. Crossley Bros., of Manchester, secured the patent rights for this country; and through the excellence of their manufactures they soon established the business on a firm footing. Of course, they had practically a monopoly of the whole trade for ten years. Although several other engines appeared during that time, yet, owing to their complicated construction, none of them enjoyed the popularity gained by the Otto engine.

The stimulating effect of the competition set up among makers and inventors was by no means all lost, as many results were obtained by their endeavours, and numerous details were perfected and patented, which put them in a better position for realizing the benefits of the Otto patents when these expired in 1890. At the expiry of these valuable patents, nearly all manufacturers gave up making their own special types of engines, and adopted the Otto cycle—recognizing in it the only really practical cycle for a simple and efficient gas-engine.

The great changes which have taken place in the engine since first brought out by Otto are: (1) The method of igniting the charge. (2) The adoption of lift-valves in place of the slide-valve. (3) The increase of compression.

These all appear exceedingly simple matters; and one is apt to wonder how so many years of constant endeavour and continuous work were required to bring about these changes. Those, however, who have done any original experimental work, and have a knowledge of the intricacies of the gas-engine theory, will allow that the great advance made within the course of 25 years or so has been well, and even quickly, brought about.

The slide-valve was for years a great hindrance to the development of the engine. High compression was impossible, as the slide had to be pressed so firmly to its seat in order to keep it tight, that great difficulty was experienced in lubricating it properly to prevent tearing. Both manufacturers and users suffered through this evil; and the slide proved a continual source of worry. Its effect upon the economy of the engine was also very considerable, not only through the necessarily cramped port area, and consequent small volume of gas and air admitted at each stroke, but also owing to the heavy drag put upon the engine, as the power absorbed in driving the slide was very considerable.

Compression has been continually on the increase ever since the adoption of the lift-valve. In the early days compression ranged between 25 and 30 lbs. per square inch, while now the

ranges found are generally between 70 and 90 lbs. per square inch, depending on the size of the engine. Of course, while stratification of the charge was so much believed in, and considered of such importance in reducing the shock of explosion, the idea of higher compression would, in all probability, have been ridiculed, as high compression and stratification are quite opposed to each other. However, this erroneous theory, and many others held by early inventors, were finally disposed of, and with the introduction of lift-valves for the admission of the charge the compression has been increased year by year as other improvements would allow, resulting in greater economy of gas consumed in the engine.

How far compression may ultimately be carried, it is impossible to say. It would seem, however, hardly practicable to increase it further under the present cycle, for the simple reason that all parts of the engine which receive the strain must be designed strong enough to resist the entire shock of the initial pressure of one explosion only. If we could have a compound engine, or even a double-acting engine, receiving an impulse at every out-stroke and instroke of the piston, almost any pressure could be dealt with, without the engine becoming unduly large for the power given out. At present the initial pressure rises as high sometimes as 320 lbs. per square inch; and although this is only for an instant, and occurs but once in every four strokes, yet the engine must be strong enough to resist that pressure, and excessively heavy fly-wheels are required to keep the speed constant during the idle strokes.

This increase of compression has more to do with the economy of the modern gas-engine than possibly any other change—firstly, by the reduction in the size of the compression space wherein the burned products may lodge at the end of the exhaust stroke; and, secondly, by the more intimate and closer mixing of the particles of gas and air, thereby insuring a more complete and instantaneous explosion. The highest temperature of the explosion being reached more rapidly owing to the higher compression, it is not so greatly affected by the cooling action of the cylinder, as the cylinder surface is not much exposed until the piston has moved a little forward; and by that time the bulk of the power contained in the gas has been given to the engine.

Mr. Dugald Clerk, in his excellent work on "The Gas and Oil Engine," gives some tests showing the result of increased compression on a Stockport gas-engine, as manufactured by Messrs. J. E. H. Andrew and Co., Limited, of Reddish. The engine tested was altered by fitting on compression chambers of different capacities. It gave, with 60 lbs. compression, 20·8 brake-horse-power on a gas consumption of 22·3 cubic feet per brake-horse-power per hour; while with 90 lbs. compression the brake-horse-power rose to 24·4, and the gas consumption decreased to 20·75 cubic feet per brake-horse-power per hour. This is an increase of 17 per cent. in power, and a decrease of 8 per cent. in gas consumption.

From the earliest date down to the present day the ignition of the charge has been a continual source of trouble; and there are many engines, even of recent manufacture, which give annoyance in this respect. The difficulties connected with the ignition of the charge have not easily been overcome. Being such an important factor in the economical working of an engine, there is little wonder that so much care has been bestowed upon the igniting arrangements. Of course, the ignition is the life of the engine—the vital spark, so to speak, which transforms the charge of gas and air into the power which is given out through crank and fly-wheel. When watching any good modern engine at work, fitted with tube ignition and timing valves, one is apt to imagine the whole thing very simple. But the fact is, the igniting arrangements have had to pass through many changes before being brought to their present state of perfection.

So long as the engines were of the non-compression type, the charge was easily fired by an external flame, which was sucked into the explosive mixture when the slightest vacuum was formed in the cylinder. We all know—some of us from actual experience, through the wrecking of houses, gasholders, governors, and meters—how easily a mixture of gas and air at atmospheric pressure is exploded; in fact, special precautions have to be taken to prevent accidents on this account. But compression at once changes these conditions. A flame applied to the orifice of a vessel containing an explosive mixture under pressure has no tendency to run in, but burns fiercely at the outlet of the cylinder or other vessel from which the explosive mixture is being forced.

Some arrangement had, therefore, to be got which would fire the charge inside the engine cylinder, notwithstanding the compression. Perhaps the simplest flame-igniting device, which would do this was that of Barnett, brought out as far back as the year 1838. It consisted of a stop-cock, having a hollow plug, in which was placed a small gas-jet. The plug had a long narrow port in one side of it, running lengthwise; and this port, when the plug was in one position, communicated with the air through a similar port in the barrel or shell. Here the jet was lighted by an outside flame, and at the proper moment (determined by mechanism connected with a moving part of the engine) the plug was turned through a quarter of a circle, when its port came opposite a port communicating with the cylinder, and fired the charge. This extinguished the jet; but it was relighted on the plug being turned back to its original position.

Otto's improvement in the firing of the charge consisted of a simple arrangement of a cavity and ports in the slide-valve, whereby he obtained a flame under pressure. This was brought about by admitting to the cavity in which the ignition jet burned a small portion of the explosive mixture from the cylinder, which gradually raised the pressure of the flame to that of the compressed charge. This arrangement was in use for many years, although not always quite satisfactory, especially at high speeds and full power loads, as great difficulty was experienced in ventilating the small passages and cavity in which the jet had to burn. When we consider that ignition had to take place as often as 100 to 150 times a minute, according to the speed and load on the engine, we may admit that the clearing out of these small passages so rapidly was no easy matter.

The electric spark has also had its share of the inventor's attention; and many valuable arrangements have been brought out. They are all, however, dependent upon a battery and induction coil; and the electrodes exposed to the explosion are so liable to corrode, thereby causing much trouble, that this system has not come into general use in this country, at least. It has, of course, its good points, which, in certain cases, are well worth the extra trouble involved in keeping the several parts in proper working order.

It was as a great boon, therefore, that the hot tube came to assist the gas-engine one step further forward; and many are the improvements connected with even such a simple part of the engine as the ignition tube. The first tubes used were made from ordinary ¼-inch bore iron gas-pipes, either welded or closed by a cap at one end, the other end being screwed into the cylinder or some part communicating with it. So long as they are new, iron tubes give a good reliable form of ignition, and are still largely used. Owing, however, to the action of the continued heat, the composition of the gas, and the pressure of the explosion on the inside, they soon get choked up by a deposition of carbon. The iron becomes quite thick and brittle; and when fractured, it shows quite a crystalline appearance.

All sorts of alloys have been made and used for the manufacture of ignition tubes, in the endeavour to get some metal that would heat easily, keep clean internally, withstand compression, and have lasting qualities. These points have not been attained with metal tubes, as they have to be made so thick that they are difficult to heat, and it takes a large amount of gas to keep them hot.

The use of porcelain for tubes was first tried by Watson in 1881, and has since been proved to be the best material for the purpose. The tubes have a drawback, certainly, in that they require more careful handling than metal tubes; but, once connected to the engine, and the joints made tight, they work admirably—tubes, after use for years, when taken out, being perfectly clean and apparently unchanged in any way.

The ignition valve is, in my opinion, a most important feature in the modern engine. Many engines are still made which have the firing tube continually open to the cylinder; and the moment for explosion is timed by raising or lowering the bunsen flame, so that the tube is heated higher up or lower down, as desired. With absolutely unchanged conditions, during the whole life of an engine, this method of regulation would, perhaps, be perfect. The burned gas and air left in the tube, if compressed to exactly the same extent each compression stroke, determines the position in the firing tube to which the fresh explosive mixture will be forced; and if the heated portion of the tube is properly adjusted, ignition will not take place until the full compression has been reached—that is, when the piston is full in, and the crank just passing the dead-point.

You will readily see, however, that we have many circumstances to deal with before we can insure absolutely constant conditions. The compression which we depend upon to force the fresh charge up to the same height in the tube every time, may not (owing to the speed of the engine or to a leaky piston or valves) be always sufficient. Then the tube, unless made of some incombustible and incorrodible substance, will change its character and size. And, lastly, the continual varying conditions of pressure in the gas-mains will slightly alter the proportion of the charge, and possibly affect the bunsen flame, and therefore the heat of the tube.

With a timing-valve, we at once get rid of nearly all these difficulties. The distance from the cylinder to the tube can be made exceedingly short, so as to insure that even the most variable charge will reach the heated portion; and early firing is prevented by the timing-valve, which is opened mechanically as the crank passes the dead-centre. Besides, nearly all gas-engines are now fitted with an adjustable governor, so that the speed of the engine may be altered while running. If there is no timing-valve, the economy of the engine, should the speed be much altered from the normal, may be seriously affected; a higher speed causing early firing and knocking of the piston and connecting rod, while a lower speed may cause slow firing and even miss-fires.

I regret that, owing to building operations for the extension of our works, I have been unable to prepare any special tests to lay before you, as our testing arrangements have all been upset. However, as there have been recently many exhaustive tests made and published by some of the highest authorities on the gas-engine, I do not think you will miss anything I could have given you, meantime, in this way.

With your permission, I should like briefly to refer to some of the improvements, chiefly connected with details, which my

own firm have introduced. Our engine is of the usual Otto type, and is designed specially to render it as simple and reliable as possible. The explosion chamber at the end of the cylinder, into which the charge is compressed, has had our greatest attention, and we have tried many different shapes. The design we have at last adopted for this part is in the shape of a cylindrical cone. The base of the cone is next to, and of slightly larger diameter than the cylinder, which gives the necessary clearance for the end of the piston. The length is regulated by what is required to admit the exhaust valve; while the small end of the cone depends on the space necessary for the amount of compression required. In this way we get as large and open a space as possible; so that the explosion is not choked or cramped. The whole charge also is confined in one space; there being practically no ports or passages in which the burnt products may lodge. The inlet-valve for admitting the charge is placed directly behind the exhaust valve on the centre-line of the cylinder; and it opens into a short cavity, the front of which freely communicates with the compression space, while at the back of the cavity is a small short hole leading to the ignition tube. The gas enters from the gas-valve, and, mingling with the inrushing air, both pass through the inlet-valve into the compression space, clearing out the cavity and tending to suck the burnt products of a previous explosion from the ignition tube.

The other points I would draw your attention to, and which, I believe, are quite novel, are the cylinder oiler, the ignition tube, the timing valve, and the crosshead bearings in small

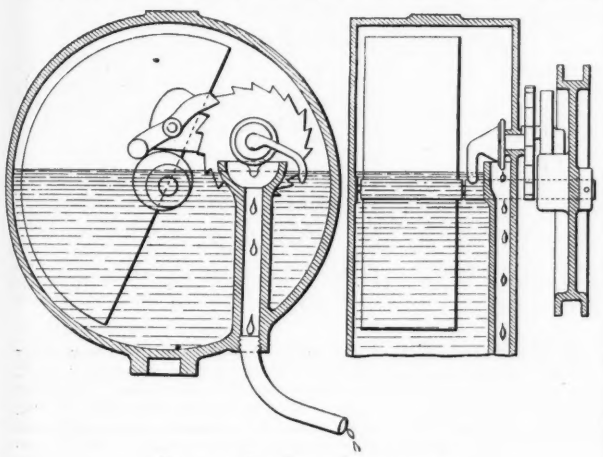


Fig. 1.—Cylinder Lubricator.

engines. You will notice in the oiler (fig. 1) your old friend the semi-cylindrical float, used by Sanders and Donovan for their wet gas-meters. The importance of absolutely constant oiling for the cylinder cannot be overrated, as the high temperature of the flame of the explosion soon burns off the thin film of oil on the surface of the cylinder; and if this is not continually renewed, cutting of the cylinder at once takes place. The float in this vessel keeps the oil always at the same height, so that the small rotating spoon, driven slowly round by the engine, receives exactly the same amount of oil at each revolution, and this continues during the whole time the engine is running.

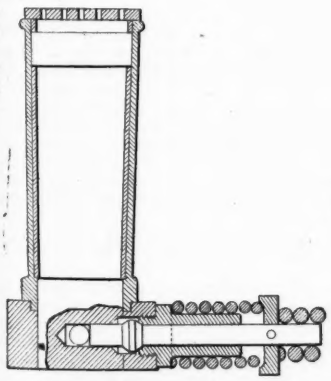


Fig. 2.—Ignition Valve and Chimney for Bunsen Burner.

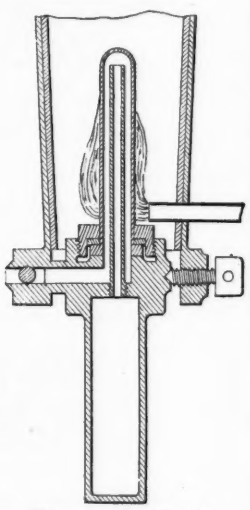


Fig. 3.—Porcelain Ignition Tube and Holder.

The ignition-valve (fig. 2) consists of a straight steel spindle, about $\frac{3}{8}$ inch diameter, which closes and opens the passage from the cylinder to the ignition tube, when moved to-and-fro by a lever through a cam on the side shaft. It is sometimes astonishing what a small trifle prevents the regular firing of the charge; the least increase or reduction in the size of the ignition hole being sufficient to cause the charge to miss fire. The form of this valve allows of a perfectly straight hole from the cylinder to the tube, which is very important, as any bends or elbows are not conducive to sharp instantaneous firing. The valve is very loosely fitted, and just crosses the hole from the cylinder to the tube. During compression the small portion of the fresh mixture, which passes the valve owing to it not being quite tight, gradually drives out the products of the previous explosion into a chamber in the ignition tube holder. The valve rod works easily in a long gun-metal gland; and, to prevent leakage, it has a double-faced valve turned upon it. The valve rod is pushed in—not directly by the lever, but by means of a strong spring; and the inner valve face prevents leakage during compression. At the moment of explosion the cam on the side shaft releases the lever, and the spring is withdrawn; while another spring comes into play and pushes back the valve rod, closing the other valve face upon its seat. This valve works well and gives no trouble. One has been in constant use in one of our engines for over three years; and, to my knowledge, it has not been taken out for any repairs or adjustment.

The ignition tube (fig. 3) we have adopted is made of porcelain. It is unusually short, closed at one end, and the open end has a flange formed on its outside, by which a hollow nut secures it in position, in a specially constructed holder. A small metallic tube extends from the holder inside and almost to the top of the porcelain tube; so that the burned products of a previous explosion pass down this small tube into a chamber at the bottom of the holder, which allows the fresh charge to reach the heated porcelain. The small metal tube does not undergo any change, as it is never red hot, and the pressure on it is equal both outside and inside. This ignition tube has given great satisfaction; the ignition is most reliable, taking place with certainty at either fast or slow speed.

The difficulty of fitting small engines with adjustable brasses for the end of the connecting rod in the piston is so great, on account of the small space available, that many engines are made without this provision at all. Consequently, when the least wear of the crosshead pin takes place, the only remedy is to fit in a new pin. To avoid this we have reversed the order

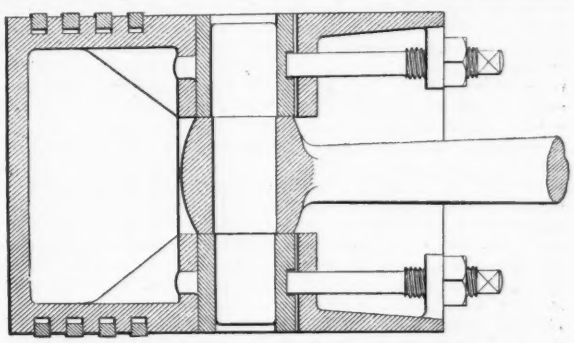


Fig. 4.—Piston of Small Engine, showing Method of Taking Up Wear at Crosshead.

of things, by placing the adjustable brasses in the piston (fig. 4), fixing the pin so that it turns with the rod. By this means, although a little costly at first, the smallest engine can be adjusted when wear takes place at the crosshead pin.

There can be no doubt that a great deal has yet to be done to improve the action of the gas-engine. The main direction in which a change must be looked for is, I think, in the cycle. But this would seem almost impossible without introducing complicated mechanism. At present—at least with the smaller sizes—the successful competition of the gas-engine with the steam-engine is chiefly due to the convenience and economy with which the gas-engine can be operated, especially for intermittent work. With engines above 40 or 50 horse power, using producer gas, the cost of working, as compared with steam, is very greatly in favour of the gas-engine, as has been proved time after time. We shall find, therefore, that the large gas-engines will not stop at 400 or 500 horse power, but increase gradually year by year, until they compete in power with the largest steam-engines made.

What the gas-engine has done for the benefit of small masters, it is impossible to estimate. Many hundreds of these employers were driven out of existence by the introduction of the steam-engine. But they are gradually springing up again; and, by the aid of the gas-engine, they are able to secure a respectable share of trade. That the gas-engine will rank in the near future as one of the chief sources of power there can be no doubt; and I would add, in closing, that as gas managers are chiefly concerned in the manufacture of the working fluid, they should do all in their power—by giving a plentiful supply, at a good pressure, and, if possible, at a reduced rate—to help forward this excellent motor to a greater extent of usefulness.

Discussion.

The President said they had listened to a very graphic

description of the gas-engine; and if anyone wished to put any questions to Mr. Peebles, he would be pleased to hear him. He (the President) would like, for his own sake, to have had a comparison of gas power with steam power, if Mr. Peebles had been able to give it, as it would have been interesting to many of those present.

Mr. D. Vass (Edinburgh) said he should like Mr. Peebles to give them the working pressure which he found most serviceable. A gas-engine, as a rule, was required during the day, when they wished to keep their pressure as low as possible; and as this caused them to have their pressure extra low in some districts, it might not be serviceable. A hint from Mr. Peebles in this direction might be useful; and perhaps, also, he might give them something in the way of figures for the sizes of pipe required per horse power. This would be of service to anyone contemplating using a gas-engine.

Mr. J. Napier Myers (Saltcoats) said he would join with others in thanking Mr. Peebles for his efforts to instruct them in the matter of gas-engines. One question arose in his mind with regard to supplying gas for engines, and it was which, in Mr. Peebles's opinion, was the best way to measure the gas for an engine—whether through a dry or a wet meter.

Mr. Peebles said, with regard to Mr. Vass's question, he considered the best pressure for working a gas-engine was about one inch. They, as a rule, arranged the different valves—at least his firm did—to get a supply at about an inch pressure. They knew what they got in this way. If the pressure went down below that, the gas-engine maker, in putting in an engine, had to reduce the air supply, in order to make the engine work satisfactorily with the reduced gas. The consequence was that the cylinder did not get a complete charge of gas and air, and they were working with a reduced charge all the time. The effect on the engine was that they had not only a drag put upon it, but had also the reduced charge, giving them less effective power, at each explosion. He considered an inch pressure was, as a rule, easily obtainable during the daytime in good districts. But very often, through large consumptions in certain districts, by other engines being at work, by having small mains, and other things, pressures were much lower than that; and this had to be fought against. As to the capacity of the mains per horse power, there could hardly be a rule laid down, as it was a matter for individual and local consideration. The pipes up to the meter should be a good deal larger, if possible, than the connections of the meter recommended by the engine maker. It would be found an advantage in the case of large engines to put in the street, as near the engine as possible, a length (say) of 12-inch main-pipe, so as to form a reservoir from which the engine could easily draw its supply. This would also tend to reduce the pulsations occurring in the immediate neighbourhood caused by the engine. He could give the members a list of the different meters his firm recommended for engines, which, he thought, they would find to be larger than the meters used by any other gas-engine maker. The reason they did this—and he thought he impressed this upon the members last year, in the discussion upon Mr. Pooley's paper—was that they considered the meters put in in the past by other manufacturers to be too small, owing to their not understanding the effect upon the meter of the sudden withdrawal of gas out of it. Of course, being meter manufacturers, they had the advantage of knowing the effect that would take place in the meter, which was this—and he had tested it—that at each draw of the engine, unless they had a large meter, they sucked in the diaphragm, and obtained more gas per revolution of the meter than it was actually intended to give. There was a certain space in a meter which was a constant, as it were—which was not emptied when the meter was working under ordinary conditions; but if they put on a gas-engine to draw the gas quickly out of the meter, they emptied this space, and emptied the meter beyond its normal condition, and thereby got gas for nothing. Mr. Myers asked whether it was better to measure through a wet or a dry meter. He should certainly say a dry meter, and for this reason—that, especially if the weather were at all warm, the water in a wet meter was apt to evaporate, and wet the gas. They had found this in an experiment they were recently making. They were trying to get a new anti-pulsator, and they got something which acted admirably. The idea was to use the water-vessel which was sent with every engine, and to put a bell into it; but they found, after a week's working, that the pipes were all filled with condensed water. He thought this answered Mr. Myers's question, and showed that a wet meter would not be a good thing to use. Mr. Wilson had asked for a comparison between the gas-engine and the steam-engine as regards cost of running. This was a very intricate question, depending on so many considerations. He thought that certainly the gas-engine had the advantage by a long way, especially for small powers. And it was the same for large powers, because producer gas then came into operation. For small powers, where coal gas was used, the gas-engine worked out, as a rule, at 1d.—sometimes ¾d.—per brake-horse-power per hour. They would very seldom find a small steam-engine working for anything less than 2d. or 2½d., which showed a considerable difference in favour of the gas-engine over a steam-engine.

Mr. W. Foulis (Glasgow) asked what was the price of coal and of gas.

Mr. Peebles said gas at 3s. per 1000 cubic feet, and coal at 10s. per ton.

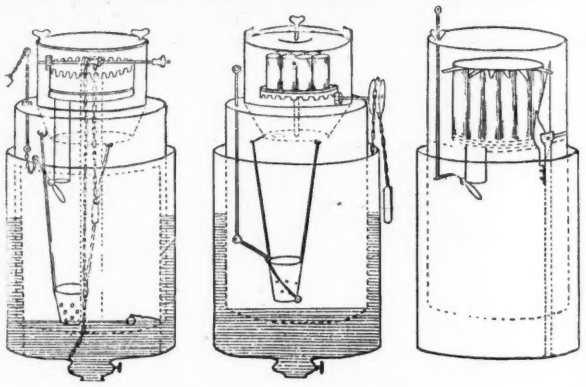
REGISTER OF PATENTS.

Automatic Pressure-Regulators.—Leigh, H. H.; a communication from F. V. Maquaire, of Paris. No. 16,652; July 13, 1897.

This invention relates to a system of automatic pressure-regulators, the object of which is "to maintain between two fixed limits the variations in the pressure exerted by the fluids by one movement, whatever may be the absolute pressure resulting from the actions or movements brought into play by the fluids in question." This object is attained by an arrangement of balanced dynamo-metric commutator-lever, serving both to measure the value of the phenomena it is desired to regulate, and to control, either directly or indirectly (by the aid of feed motors and connecting gear), the apparatus necessary to effect the regulation. The particular combination preferred is not, however, described apart from a sheet of detail drawings accompanying the specification.

Generating Acetylene.—Barnard, E., of Christchurch. No. 17,090; July 20, 1897.

This apparatus consists of two cylinders, one rising and falling within the other (like an ordinary gasholder); the lower and larger one containing the water used in the generation of the gas, and also forming the gas-seal. Depending from near the top of the smaller and inverted cylinder, hangs a receiver for the carbide of calcium; and as the smaller cylinder descends, carrying the container with it, on touching the water, gas is generated, and the inverted cylinder rising lifts the carbide out of the



water, but does not really stop the generation of the gas. To prevent any excess of gas being generated beyond what is at the time being consumed, the patentee combines with the rising and falling receiver "a rotating mechanical device set in motion by the rising and falling of the cylinder, such as a revolving wheel, discs with holes corresponding, through and by which carbide placed above might be automatically discharged into the carbide receiver." As an alternative, "a pocket or other receptacle or series of pockets revolving, or rotating, or set in motion, or other like device, discharging themselves automatically of their carbide according as consumption goes on," may be used.

Three forms of the carbide-distributing device are shown in the engraving.

Making Gas from Garbage and other Refuse.—Harris, L. G., of Toronto, Canada. No. 19,887; Aug. 28, 1897.

The patentee claims a process of manufacturing a combustible gas from garbage by mixing with it "a composition of matter consisting of a liquid hydrocarbon and one or more equalizing ingredients." The composition consists of a liquid hydrocarbon and one or more ingredients, "whereby the hydrocarbon is prevented from being prematurely driven off, and the action is equalized and amplified." It consists of a liquid hydrocarbon, alkali, chloride of lime, and powdered soap bark. The ingredients are used in about the proportion of 2 quarts of alcohol, 4 lbs. of caustic alkali, 8 lbs. of chloride of lime, and ¾ lb. of powdered soap bark. When water is used instead of alcohol, about 2 gallons of water may be added. There is then added to this mixture about 100 gallons of petroleum, or a light petroleum derivative—gas oil. The total quantity of liquid so produced is sufficient for admixture with 16,000 lbs. of garbage, or other gas-producing material. It is thoroughly mixed with the liquid—preferably by passing the garbage in its wet state, as it is collected, through a mixing machine provided with an agitator and with a spraying device, by which the liquid is sprayed upon the garbage. The mixture is then distilled in retorts of any suitable construction; and the gas so produced is preferably subjected to the action of a superheater on its way from the retort to the holder, and purified in any suitable way.

Fuel-Gas Producers.—Kitson, A., of Philadelphia, U.S.A. No. 21,296; Sept. 16, 1897.

This invention, relating to fuel-gas producers, consists of certain improvements in the hearths of such producers, and in means for automatically charging the fuel, and keeping it in a continuous and uniform state of agitation. For details of construction, it will be necessary to consult the somewhat lengthy specification of six pages, accompanied by eight sheets of drawings. There are no less than forty claims for the invention thus described.

Bunsen Gas-Burners.—Moeller, J.; a communication from O. Kern, of Paris. No. 30,831; Dec. 30, 1897.

This invention relates especially to burners employed for producing light by the incandescence of a refractory mantle. Such burners, says the patentee, have been made with a tube in which air and gas are mixed and ascend; this tube having near its middle (or a little below it) a narrow neck from which the tube tapers both ways to a larger diameter—the taper of the upper portion being part of a cone, the sides of which

are inclined to each other at an angle not exceeding 10°. It has, however, been found that "the efficiency of a tube of this kind is greatly enhanced by making its taper not uniform but following the outline of a hyperbola; so that the interior of the tube is in the form of a hyperbolic spindle or solid of revolution formed by the revolution of a hyperbola round the axis of a tube."

The particular form of the hyperbola and the construction of the tubes are shown in the engravings—fig. 1 being a diagram showing the form of the hyberbola, fig. 2 a vertical section of the tube, fig. 3 a section of the burner placed on the tube, and fig. 4 a plan of the top of the burner.

FIG. 1

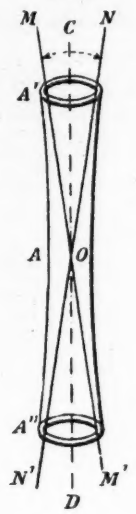


FIG. 2.

FIG. 3

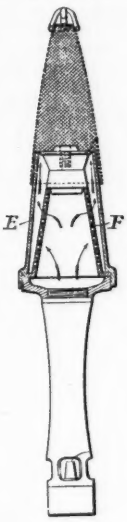


FIG. 4

In fig. 1, C D is the axis of the tube, and O the centre of the neck or narrowest part, where the radius A O of any desired dimension determines A the vertex of the hyperbola. Through O are drawn two straight lines M M^1 and N N^1, each inclined to the axis C D at an angle of about 8°. The hyperbola A^1 A A^{11} is drawn such that these inclined lines are its asymptotes. The part of the tube below the neck may be varied in length. A suitable length is three or four times the diameter of the neck. With such proportion it is found that the air which is admitted at the holes, near the base, and the gas entering by the central jet orifice form an explosive mixture while ascending to the neck through the lower part of the tube.

The burner shown in figs. 3 and 4 comprises an outer case E somewhat tapering, the inner screen F of perforated metal having at its top a button of good conducting metal, on which is fixed a disc a little smaller in diameter than the mouth of the case, and having its edge serrated so that it presents the appearance of a toothed wheel. The mixture of gas and air after ascending the lower tube passes through the perforations of the screen F, then through the annular opening surrounding the disc, and also through the intervals between its teeth. Here, being kindled, it produces "an intensely heating non-luminous flame," which heats to incandescence the mantle fitted above.

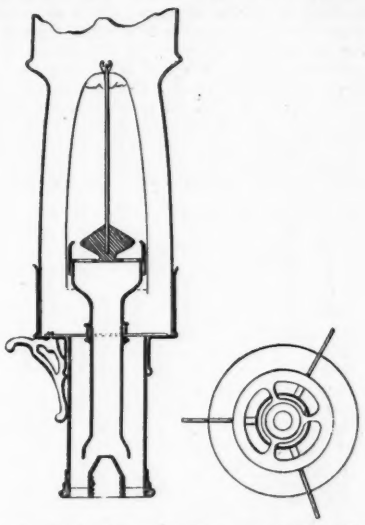
The taper of the case and the screen may be varied; they may even be made cylindrical without any taper. Also the button may be of less depth than shown; but it is preferred to have a considerable mass of metal to conduct heat from the disc to the screen F, thus preventing the disc from being overheated, and giving heat to the combustible mixture on its way to the tip of the burner.

Incandescent Gas-Lamps.—Mulch, T. H., and Wiederhold, O., of New York. No. 6659; March 18, 1898.

One of the objects of this invention is to enable the influx of gas and air to the mixing chamber or burning place of the burner to be efficiently regulated, so as to allow of the employment of the burner "for a great variety of uses, and to burn therein gases which hitherto could not be successfully burned"—for instance, the burner is adapted for use with water gas. It has heretofore been attempted, say the patentees, to burn gas at high pressures, and to regulate the influx thereof to the burner; but "such efforts have hitherto been unsuccessful, for the reason that more or less constricted passages have been used, which reduce pressure to such a degree that it is impossible to obtain a bunsen flame—it being understood that in order to have a bunsen flame it is necessary that the gas should rush out with considerable velocity." Instead of employing a constricted passage, the inventors regulate the flow of gas to the burning point by means of "as short a passage as is possible." Another object of the invention is to produce a lamp wherein the blackening of the mantle will not readily occur, and wherein the supply of air to the upper part of the mantle will be efficiently brought about, by the use of an air-drawing draught tube.

Incandescent Gas-Burners.—Lake, H. H.; a communication from A. Armellini and E. Kerbs, of Milan. No. 10,140; May 3, 1898.

This burner consists of two parts. Within the lower part B is arranged a small screw-threaded tube closed at its upper portion by a perforated plate, the perforations in which regulate the admission of gas to the burner. The apertures at the sides serve for the admission of air. The upper part rests on the lower part, in such a manner as to be readily removable. It is connected with the central portion, which is an ordinary bunsen burner except that the space where the combustion of the mixture of gas and air takes place is formed by a perfectly free annular aperture, instead of being provided with a metal mesh or grating, and that the admission of the air takes place at the base instead of at the side, and through an annular aperture instead of through holes.

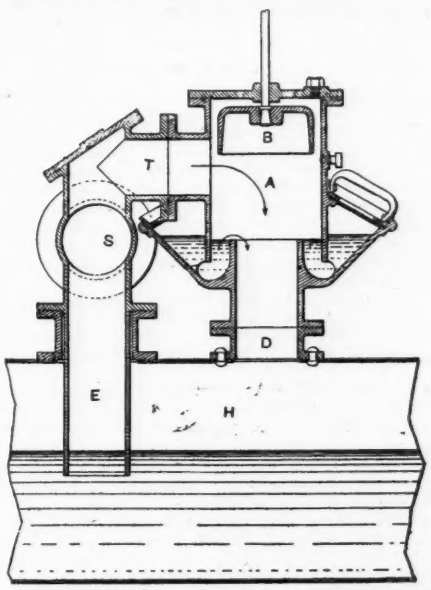


The glass chimney fits in the usual manner, and its outline follows that of the mantle; but at the part corresponding to the top of the latter, the chimney spreads out and is continued upwards in a cylindrical form. In this manner, the external air has no communication with the interior except through the aperture at foot and at the top of the chimney. As soon as the gas is turned on it mingles with the air and rises, causing a draught through the apertures at foot as in the ordinary bunsen burner; but when the heat given off by the burning mixture heats the external air, fresh air will replace that which has risen owing to the heat and that which combines with the gas during the combustion. Thus when combustion continues to take place, there exists a current of air which enters the burner through the apertures at foot; and this current of air, owing to the proportion existing between the sections of the different conduits, exerts its greatest effect in the central conduit.

Hydraulic Main Valves.—Simon, H., of Manchester. No. 10,746; May 11, 1898.

This invention has been designed with the object of enabling solid matters to be removed from the cavity or seal chamber of the hydraulic main at any moment, without interrupting the working of the plant.

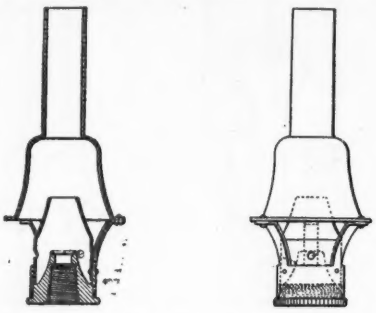
The gases from the retorts arrive by the pipe S, and pass by the pipe T to the valve B in the valve-chamber A. Thence they descend through the pipe D to the main H. With this arrangement of inlet-pipes, the double change in the direction of motion of the gases at S and T causes



any heavy matters carried in the gases to this point to drop through the dip-pipe E to the bottom of the main. The chamber containing the liquid seal opens at the bottom into an outer trough or troughs. Consequently, the liquid enters and partly fills them as well as the seal-chamber. But, inasmuch as the wall of the valve-box A extends below the surface of the liquid seal, it is impossible for the gases to pass into the troughs, and they may safely be left uncovered. It is, however, advisable, says the patentee, to cover the troughs by segment plates provided with lifting handles. As indicated by the engraving, an annular trough is supposed to be used, connected with the valve casing by means of wing walls.

Incandescent Gas-Burners.—Fritz, F., and the Daylight Incandescent Mantle Company, Limited, of Old Broad Street, E.C. No. 12,772; June 7, 1898.

The patentees state that it has been found, in practice, that the supply of air to an incandescent burner as ordinarily constructed is irregular, and the proper flow of the gas into the mixing chamber "is liable to interference by external draughts or currents of air, so as often to cause flickering of the light or even to cause the flame to be extinguished." According to their invention, in order to obviate these disadvantages, they arrange the gas-delivery apertures of the nozzle of the burner within a short tube terminating in a hollow truncated cone, supported over the nozzle so as to leave an annular space between the two parts for the passage of a current of air admitted through lateral openings in the tube. They also form or fix on the mixing-tube or chamber a second hollow cone or bell, into the base of which the first cone extends for a short distance—a suitable annular space being left between the two cones for the admission of a second current of air. The nozzle and short tube



and inner cone thus form (as it were) a shortened incandescent gas-burner; while the mixing-tube and outer cone resemble the mixing-tube or chamber of an oil-gas burner. In this manner they "provide for the flow of concentric annular currents of air to mix with the combustible gas, and thus ensure a very regular and efficient mixture of the air with the combustible gas; and, by reason of the rapid rush of the air into the annular spaces between the cones or the like, the combustible gas cannot escape or pass out except through the head of the burner."

As shown in the illustration, the base of the burner is provided with a conical top or nozzle having in its upper end the usual perforated plate through which the combustible gas passes into the mixing chamber. Over the nozzle is mounted a short tube terminating in a hollow truncated cone, and secured in a ring or annular piece screwed on the base, and provided with lateral openings for the admission of air. An outer cone or bell is attached to the lower end of the mixing-tube, on which the burner-head is to be placed in the usual way. This outer cone or bell surrounds the upper part of the cone so as to leave an annular space of suitable dimensions between them; and it is supported on arms formed on the ring and secured to the cone or bell. By this arrangement, the air enters in separate concentric currents between the inner cone and the nozzle and outer cone respectively. The air entering between the nozzle and inner cone mixes with the combustible gas issuing from the perforated plate; and the gaseous mixture thus produced, on issuing from the upper end of the cone, is mixed with a further quantity of air entering through the annular space between the cones, and finally passes up through the mixing-tube to the head of the burner.

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17,073.—Grant, D., "Gas-burners." Aug. 8.
17,079.—Gehlert, F., "Producing acetylene gas." Aug. 8.
17,083.—Kemp, T. T., "Acetylene lamps and generators." Aug. 8.
17,088.—Schumacher, J., "Acetylene generators and lamps." Aug. 8.
17,089.—Krieger, F., "Igniting device for lamps." Aug. 8.
17,094.—Brillie, E., "Governing and regulating the supply of fluids to internal combustion motors." Aug. 8.
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17,100.—Hart, F. C., "Apparatus for testing anthracene." Aug. 9.
17,101.—Hart, F. C., "Apparatus for the testing of ammoniacal gas liquor for free and fixed ammonia, and also density of same." Aug. 9.
17,127.—Bailey, J. W., and Clapham, J., "Generating acetylene gas." Aug. 9.
17,199.—Berange, F. P., "Acetylene gas generators." Aug. 9.
17,212.—Greensill, F., "Gas-stoves and heating-apparatus." Aug. 10.
17,230.—Smith, W., "Water jacket for acetylene gas generators." Aug. 10.
17,243.—Bower, A. S., "Manufacture of sodium carbonate, caustic soda, sodium, and sodium carbide for producing acetylene gas from common salt, or from sodium sulphate or sulphite." Aug. 10.
17,250.—Boult, A. J., "Automatically lighting and extinguishing gas-jets." A communication from the Automatic Gas Lighting and Extinguishing Company, Ltd. (Hoare and Kennedy Patent). Aug. 10.
17,277.—Carmont, W. E., "Regenerative gas-burners." Aug. 10.
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17,327.—Spence, H. K., and The British Acetylene Gas Generator Company, "Acetylene gas-lamps." Aug. 11.
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17,387.—Richmond, E. W. T., "Gas-grillers." Aug. 12.
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17,449.—Manger, T., "Acetylene gas generators." Aug. 13.
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17,518.—Allen, T. G., jun., "Generating and storing acetylene gas." Aug. 13.
17,525.—Otto, M., "Measuring and registering apparatus for gases and the like." Aug. 13.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Profit Sharing.

Sir,—Mr. Little, in his letter of the 9th inst., asks gentlemen, also working men, to contribute their ideas on profit sharing, and their experience of the same among working men connected with the gas industry. My advice to Mr. Little, as a worker, also as a profit sharer in the South Metropolitan Gas Company, is to make further inquiries into the working of the scheme as practised by them. He should send for the rules, and master their details. He would thus learn how to prevent the lazy and incapable from sharing in profits they had not honestly helped to create. If "example demonstrates the possibility of success," then the success of the profit sharing of the above Company is an example unique in the history of human efforts and endeavours to assist the working man to help himself.

I hope that something may be said which will assist Mr. Little in his inquiry and desire to do good and benefit his workpeople—a desire to awaken in them a more intelligent interest in their work, and good done to all concerned. The lazy are made industrious, the incapable improved, and the intelligent workman made to feel he has greater interests at stake. This encourages him to do his best, "that by the force of his own merit to make his way."

I don't think anyone can give a better reason for the adoption of profit sharing than Mr. Little has done in his letter. If it has worked such changes in his chiefs and foremen, I am sure the same changes will take place with his workpeople. Such distinctions are the cause of dissension, and must lead to discord and bad feeling between workman and foreman. My experience under our profit-sharing scheme is that the intelligent workman becomes more stable, has less desire to change when other inducements crop up, and is less likely to be disturbed with the changes constantly taking place in the labour world—the ever-recurring conflicts between labour and capital. The more the principle of profit sharing is adopted, the more will the possibilities of the conflict be narrowed down. Consequently the stability of the business of those who adopt it is more secure against constant warfares and suicidal strikes. If workpeople become shareholders in the concern they work for, it follows, as light follows darkness, that they will become more thoughtful and less likely to be influenced by the socialist agitator. Such is my experience, supported by one of the latest additions to profit sharing. Messrs. Richmond & Co. found it to work so well at their Warrington works that they have extended it to their Stratford factory; and I hope soon to read in the "Journal" that Mr. Little has added his firm to the growing list of profit sharers.

East Greenwich, Aug. 16, 1898. H. Austin.

Sir,—I have just returned from a short holiday in parts where even the "Journal" does not penetrate; and on looking through the back numbers I see Mr. Gilbert Little's letter on the above subject in your issue of the 9th inst. All additions to the ranks of profit-sharing employers are to be cordially welcomed, even if they have only got a small way on the right road. Experience of the system will, I believe, tend to its wider application in Mr. Little's own case, besides drawing attention to the system in his own locality.

One prominent feature, however, should not be lost sight of—viz., that profit sharing to be successful must benefit the men as well as the employer. Now, Sir, my reading of Mr. Little's letter is typical of the view many employers take of this question. They ask only what benefit they will get. Surely the men will in return be likely to approach the question from the same standpoint of self-interest only, instead of the one we want profit sharing to inculcate—*i.e.*, *mutual interest*.

I quite agree that heads of departments and foremen can save and make more than an ordinary workman. We recognize this by giving the foremen 50 per cent. more than the workmen and managers 100 per cent. more; but we believe the men and boys ought to have some share of the profits earned after the ordinary share capital has had 6 per cent.

I would ask whether it is not better that some who have not earned their profit should have it, than that those who may have earned it be passed over. Therefore, we pay every employee who qualifies by three months' service and signs our forms—although the Directors reserve to themselves the right to eliminate the names of those who may not be desirable, which might mean that they were not worthy of employment. Our Profit-Sharing Committee serves a useful purpose in dealing with the merits of any individual.

The great need of the working classes is to learn thrift; and it surely is no small help toward this object to make them all shareholders, and to open a small savings-bank account for them. To spend is natural to many; to save is natural to few. If profit sharing makes for thrifty employees (and we believe it does), the advantage to all concerned is mutual and at once apparent.

I have ventured to trespass thus far upon your space as our system was referred to; and I can only hope that those who decide to adopt the system will do so on broad and comprehensive lines.

Romford, Aug. 18, 1898. E. W. T. Richmond.

P.S.—Since writing the above, I have seen Mr. Manley's letter, representing the South Metropolitan Profit-Sharing Committee, and quite agree with it.—E.W.T.R.

Discounts for Large Gas Consumers.—At last Wednesday's meeting of the Goole Urban District Council the Gas and Water Committee recommended that the North-Eastern Railway Company should be allowed a discount of 15 per cent. off their gas account. One of the councillors, in opposition to the proposal, contended that the 15 per cent. would cost the Council more than they would make by the extra 2 million cubic feet of gas they would sell. Moreover, the Aire and Calder Navigation and the Lancashire and Yorkshire Railway Company both consumed more than 2 million feet of gas, and only received 10 per cent. reduction. A warm discussion ensued, and eventually the proposal was carried by a large majority.

MISCELLANEOUS NEWS.

THE HOME OFFICE WATER-GAS COMMITTEE.

We understand that the following letter has been recently addressed to a number of Gas-Works Engineers throughout the country, by the Secretary of the Committee charged by the Home Secretary with the task of inquiring into the subject of the supply of carburetted water gas, in certain towns and districts, in admixture with coal gas:—

Whitehall.

Sir,—I am directed by the Chairman of the Water-Gas Committee to say that he will be much obliged if you will favour him with your views upon a proposal which has presented itself as worthy of consideration since the Committee had the advantage of hearing your evidence.

Assuming that the Committee came to the conclusion that some steps must be taken to secure consumers against the dangers necessarily, in certain circumstances, attending a high proportion of carbon monoxide in the gas supplied to them, and having in view the fact that it is during sleep that the most serious danger would appear to occur, it has been suggested that a distinction might be established between the gas supplied during the day and that supplied during the night.

Provided that the carbon monoxide in the night supply was kept low, the proportion of that gas which might be distributed during the day might reasonably be held to be a matter of minor importance.

The proposal is that the gas supplied after (say) 9, 10, or 11 p.m. should be required to contain not more than a stated proportion of carbon monoxide. The exact limit remains for further consideration—*e.g.*, whether it should be 15 or 16 per cent., or whether it should be only slightly above the normal percentage in coal gas. Similarly, the question whether any limit or none should be placed upon the percentage in the day supply, need not for the purposes of the present question be decided.

Lord Belper is anxious to have your opinion from the business point of view of a practical supplier of gas, as to the ease with which you could, by manipulating your sources of supply, comply with a regulation that, after a given hour, a sample of gas taken as it entered a house in any part of your district should not contain more than a somewhat given percentage of carbon monoxide.—I am, &c.,

JOHN PEDDER,
Secretary to the Committee.

LIVERPOOL UNITED GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Tuesday—Mr. E. LAWRENCE, J.P., the Chairman of the Company, presiding.

The report presented by the Directors showed that in the six months ending June 30 the revenue was £534,930, and the expenditure £418,144; leaving a surplus of £116,786, which had been transferred to the profit and loss account. After deducting the amount taken for the payment of the dividend declared last February, and interest on the debenture stock, there remained a balance of £52,621, out of which the Directors recommended the declaration of a dividend for the half year of 5 per cent. on the ordinary stock, and of 3½ per cent. on the 7 per cent. stock.

The CHAIRMAN, in moving the adoption of the report, referred to the loss the Company had sustained by the death of one of the Directors—Mr. J. Barkeley Smith—whose place had been filled by the appointment of Mr. T. Comber. With regard to the accounts submitted, he thought he might safely congratulate the shareholders on the fact that these were of a satisfactory nature. The past winter, as they were aware, was one of the mildest experienced for a long time; and he was afraid at one period that they might have to show a very considerable decrease in the quantity of gas sold in the year. However, during the last three or four months of the financial year a very considerable increase took place; and the proprietors would be glad to see that the deficiency on the sale during the twelve months was a mere bagatelle—a matter of only £2400. He was of opinion that they had every reason to feel very satisfied with this result. If they looked at the achievements of many other companies, they would find that they suffered from like causes to those which had affected the Liverpool Company, and many of them had had to mark a very considerable decrease in the quantity of gas sold. Perhaps it would be more satisfactory to the shareholders if he told them, as an indication of what was going on in the public world, that during the six weeks which had elapsed since the close of their year they had had a very marked increase in the consumption of gas as compared with 1897, though at this period of last year it showed a considerable increase over the preceding twelve months. Up to date, they had actually consumed this year more than 5 per cent. of gas in excess of the quantity burnt in the same period of 1897. This, he thought, showed that there was nothing very alarming in the condition of affairs. He knew he had been called an optimist with regard to the consumption of gas; but he did not think he had ever said anything he was not warranted in saying. He had not spoken in any wild optimistic strain, but had merely from time to time told them of the conclusions he had formed upon the facts before them. He could only again repeat that he did not think the holders of gas stock had any reason to be alarmed in regard to their property. It was true that they had to meet with very serious competition in the electric light. He had never refused to acknowledge that fact. There was no doubt that the Corporation, who were now the owners of the electric lighting plant, were doing everything possible—and very naturally—to promote an increase in the consumption of electricity. Therefore the Company had to meet what might almost be called a fierce competition from them. But there they were, in spite of all the competition and opposition, maintaining the position they had long held with regard to their property; and he had no reason whatever to doubt that this property would be just as safe in years to come as it had been in years that were past. After alluding to the rapid increase in the price of coke, and dealing with other details connected with the accounts, he said that after the payment of the dividend as recommended there would remain a balance of £837 to the credit of the profit and loss account. The reserve fund account went on gradually increasing each year. There was no doubt the working of the plant and machinery during the past year had been most satisfactory. Everything had been well conducted; and the results achieved in the different departments had been on a par with anything they had had before. He thought they owed a great deal to their officials for the zealous way in which their duties were discharged. Mr. King looked very faithfully after the manufacturing department, and Mr. Robinson after the administrative department; and they were seconded by an able staff. He thought they might feel that their interests could not be in better hands.

Sir T. EARLE, Bart., seconded the motion.

Alderman STOLTERFOHT mentioned that there was the question of water gas. They could not, he said, be ignorant of the fact that there were, whether rightly or wrongly, many and loud complaints about the quality of the gas supplied in several districts of the town. He had spoken to the Engineer and others, and had always been assured that he was wrong, and that there was satisfactory evidence that everything was of the best quality. He thought, in face of the serious competition of the electric light, it was necessary that they should in every way possible avoid all cause of complaint on the part of the gas consumers. He thought there was rather too much disposition to pass over these complaints. A medical gentleman stated that gas with which water gas was mixed was very deleterious to human life, especially in the case of invalids. He could not say anything about the quantity that was mixed; but he believed that about 25 per cent. was used in London.

The CHAIRMAN, in reply, said he could not agree with Alderman Stolterfoht, because he was convinced that there was no ground for complaint. He was speaking now as to the quality of the gas for purposes of illumination. With regard to the question of water gas, it was a very difficult thing to answer from their point of view in a way that would be satisfactory to those who had apparently already made up their minds against it. It was impossible for them to consult everyone who might have a theory, and consider himself an expert in gas matters or in chemistry, and arrange their manufactures in accordance with these views. They had necessarily, as the shareholders would understand, to take the view they considered to be right in the matter, and act upon it. There was no law or regulation guiding them as to the quantity of carburetted water gas which should be mixed with coal gas. The proprietors were aware, no doubt, that in the principal towns in North America scarcely anything but water gas was used; and he could not help feeling that this was to a very great extent an answer to those who pointed to the dangerous qualities possessed by this gas. He was not going into this question, as he did not consider it was his province to do so. They were guided by the very best advice as to the way in which they mixed the water gas with coal gas. There was a Departmental Committee of the Government sitting at the present time to inquire into these matters; and if it resulted in legislation in reference to the quantity of water gas that was to be permitted, he could only say the Liverpool Gas Company would very loyally abide by it. Alderman Stolterfoht said he believed in London 25 per cent. was used. He (the Chairman) was not quite sure about London; but there were many large towns in England where a very much larger percentage was employed, without any objection being made to it. Alderman Stolterfoht had mentioned that a certain amount of public feeling had been aroused; but he (the Chairman) believed this had been done, in the main, by gentlemen who had theorized on the matter, rather than by those who possessed a practical acquaintance with the work. He thought one of the most amusing statements made in connection with the objections raised to water gas was to be found in the remarks made by a gentleman who occupied a prominent position in municipal affairs. He said he was quite satisfied that the Company were using more water gas than they ought to do, for, when sitting in his house, he had felt that he was being affected by the peculiar noxious fumes said to arise from this gas. The proprietors would hardly believe it, but into this gentleman's house not one foot of water gas had ever been introduced, for it was situated in a part of the town where, if the Company wanted to supply it, they could not do so. If there were any danger at all, it did not arise from the use of the gas itself, but from leakage. They might rely upon it that the Company would recognize their obligations to the public to the fullest extent possible, and everything would be done to supply them with an article respecting which there could be no cause of complaint. He claimed that in regard to the quality of the gas they had no such cause. They were watched by the Corporation; and the result of their experiments during the whole year showed that the quality of their gas was higher than was required by Act of Parliament. His desire, as Chairman of the Company, was to do everything possible that would be conducive to the safety of those who used water gas. He did not think anybody could ask that it should not be used. It had proved to be very largely employed in America; and there was no reason why, with proper care, it should not be used in England. It had sometimes been stated that in America the case was different, because the gas companies were obliged by law to test the fittings before gas was supplied. They had made inquiries, however, and found that there was no obligation to test the pipes—that some did so for their own purposes, and others when they were asked to do so by the tenants.

The motion was then put, and carried unanimously.

The dividends recommended were then declared; and the retiring Directors and Auditor having been re-elected, the proceedings closed with a vote of thanks to the Chairman.

BRISTOL GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Thursday, at the Company's Offices, Canon's Marsh—Alderman J. W. S. DIX, J.P., in the chair.

The SECRETARY (Mr. J. Phillips) having read the notice convening the meeting, the report and accounts, dealt with in the "JOURNAL" last week, were presented.

The CHAIRMAN, in moving the adoption of the report, remarked that the accounts were perfectly clear and open. It was true that the Company had not earned their dividend by nearly £3600; but when he mentioned that they had had to pay £3300 extra for coal, that £2000 less had been received for coke and £1400 less for tar, that there had been a reduction in the charges for stoves, a lowering of prices in the added areas, and that during the last few years gas had been reduced 6d. per 1000 cubic feet, which was in itself a lessening of the income by £36,000, he

thought that the Company had done exceedingly well, and that it was a matter for congratulation that they had come out so well as they had. The Directors intended—as they had always endeavoured—to do the best they could for the shareholders and the public. People were beginning to find out their interest in the department of domestic economy; and the number of orders received for the hiring of stoves really occasionally overwhelmed the department. The result was that applicants were not always supplied as quickly as the Company would like. They were facing their responsibilities, too, with regard to the outer districts. Last year a gasholder was erected at Bedminster; the year before, one at Warmley; and they were now going to erect one at Horfield. He trusted the receipts would increase proportionately to the efforts put forth by the Company for the convenience of the public.

Mr. R. D. Robjent seconded the motion, which was carried unanimously.

On the motion of the Chairman, seconded by Mr. A. J. Smith, the usual dividend resolution was passed.

A vote of thanks having been accorded to the Chairman and Board, the meeting closed.

TOTTENHAM AND EDMONTON GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the half-yearly meeting next Saturday, they state that the quantity of gas sold in the six months ending June 30 showed an increase of 15,613,300 cubic feet, or 7·29 per cent., on that of the corresponding period of 1897. The total number of meters in use at Midsummer was 13,118, of which 6672 were ordinary and 6446 automatic; the increase being 427 ordinary and 1643 automatic—a total of 2070—as compared with Midsummer, 1897. The number of cooking-stoves fixed and on rent on the 30th of June was 2134; the increase over the corresponding half year being 419. The revenue from the sale of gas amounted to £34,261; rental of meters and stoves, to £2644; and residuals, to £3448—the total being £40,363. The expenditure on the manufacture of gas was £21,593 (coal, oil, and coke figuring for £13,496); on distribution, £4091; on management, £2130—the total outlay being £31,132. In the manufacture of gas, under Mr. Broadberry's supervision, 10,747 tons of coal and 428,220 gallons of oil were employed; the make of gas being 244,429,000 cubic feet, of which 234,507,000 cubic feet are accounted for. The estimated quantities of residuals produced are given as follows: Coke, 6623 tons, of which 2321 tons were used in making carburetted water gas; breeze, 1323 chaldrons; tar, 152,232 gallons; ammoniacal liquor, 2985 butts—the make of sulphate being 97 tons 18 cwt. The amount available for distribution is £10,258; and the Directors recommend dividends at the rate of 12 and 9 per cent. per annum. These will absorb £8814, and leave £1444 to be carried forward. The Company's Bill to sanction the consolidation and conversion of the capital has passed, and the Act comes into operation from the day of the meeting.

CROYDON COMMERCIAL GAS COMPANY.

Half-Yearly Report and Accounts.

At the half-yearly meeting of the above-named Company next Friday, the Directors will submit the accounts for the six months ending June 30, which show that the total quantity of gas sold in that period was 2·93 per cent. more than in the first half of 1897. The total revenue was £57,288, of which £44,160 was for gas, £2627 for meter-rents, and £10,426 for residuals—the receipts from these sources showing a reduction of £1432, arising partly from the still further fall in the market value of tar, and also from a diminution to the extent of 7208 tons in the quantity of coal used, resulting in the production of 4324 tons less coke. The total expenditure was £40,954; coal, oil, &c., costing £19,053. Though the quantity of gas sold was greater than in the corresponding half of last year, the expenditure upon oil, coal, &c., was £2145 less; and there was also a saving of £579 in wages. These satisfactory economies result from the introduction of carburetted water gas. Large numbers of additional gas cooking and heating stoves were fixed, and 324 small houses were fitted up and supplied with gas under the weekly prepayment and automatic meter systems, during the half year. Under the supervision of Mr. J. W. Helps, the Engineer and Manager, there were used in the manufacture of gas 22,520 tons of coal, 104 tons of cannel, and 254,109 gallons of oil; the quantity of gas made being 332,529,000 cubic feet, of which 321,310,000 cubic feet are accounted for. The estimated quantities of residual products are given as follows: Coke, 13,574 tons; breeze, 3709 tons; tar, 284,302 gallons; ammoniacal liquor, 635,392 gallons—the make of sulphate of ammonia being 206 tons. The amount available for distribution is £15,405; and the Directors will recommend dividends at the rate of 14, 11, and 9 per cent. per annum upon the different classes of stock, all less income-tax. The payment of these will take £14,811, and leave a balance of £594.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

At the half-yearly general meeting of the Bath Gas Company next Friday, the Directors will recommend the payment of maximum dividends. The sale of gas in the six months ending June 30 produced £27,524; residuals, £4328; and the total revenue was £33,550. The expenditure on the manufacture of gas was £20,147; on its distribution, £2519; and on management, £1492—the total being £26,208; leaving £7342 to go to the profit and loss account. The balance of net profit is £10,489. Under the supervision of Mr. C. Stafford Ellery, 17,199 tons of coal and 141,156 gallons of oil were employed in the manufacture of gas; the residual products being: Coke, 9871 tons; breeze, 1100 tons; tar, 932 tons; ammoniacal liquor, 481,000 gallons—the production of sulphate of ammonia being 149½ tons.

The half-yearly meeting of the Colchester Gas Company was held last Friday—Mr. Charles Coleman in the chair. The revenue account to June 30 showed a balance of £2155, which, with £11,602 brought forward and £83, formed the credit side of the profit and loss account—totalling £13,840. This was balanced on the debtor side by dividends £2050, and interest £180; leaving a remainder exceeding by £7 10s. that carried forward at the commencement of the half year. The report and accounts were adopted; and it was decided that a dividend of 10 per cent. should be paid on the old shares for the six months ended June 30, and one of 5 per cent. on the new shares. Votes of thanks were passed to the Chairman, Directors, and Manager (Mr. H. S. Pike).

The sale of gas by the Dover Gas Company in the six months ending June 30 produced £12,164; and the total revenue was £16,612. The coal employed in the manufacture of gas cost, including carriage and labour, £5720, and a sum of £627 was paid as town dues thereon. The total expenditure was £13,485; leaving a balance of £3127. At the meeting of the Company on the 5th prox., the Directors will report a satisfactory increase in the consumption of gas, largely due to its extending use for cooking and heating purposes. They were unable to secure contracts for coals for the current year except at an advance in price, which will entail an increased expenditure on this item of about £900 per annum. The price of gas to private consumers has been reduced 1d. per 1000 cubic feet; and had it not been for the rise in the price of coal, the reduction would have been 2d. The Directors will recommend the usual dividend for the half year at the rate of 7½ per cent. per annum.

The last annual meeting of the Filey Water and Gas Company, before the handing over of the concern to the Urban District Council, was held last Friday. The Mayor of Scarborough (Mr. J. Pirie), who presided, read letters from several shareholders, all congratulating the Directors upon the terms they had secured. He said the sum paid for the undertaking, with the expenses, would amount to £58,000, which, all things considered, was very satisfactory. It was expected that the taking over of the works would be completed by the 29th of September; and if not then, the Council had agreed to pay them 4 per cent. until it was completed. He moved the adoption of the report, recommending maximum dividends; and the motion was carried unanimously.

The Directors of the Hartlepool Gas and Water Company have another very satisfactory report to submit to the shareholders at the annual meeting to be held on the 31st inst. There has been a steady increase in the consumption of both gas and water. The revenue amounts to £30,436, as compared with £30,386 last year. The Directors recommend the payment of a dividend for the half year at the rate of 10 per cent. per annum on the "A" shares, 7½ per cent. per annum on the "B" shares, and 7 per cent. per annum on the "C" and "D" shares; leaving £1733 to be carried forward. The erection of additional gas-works is being proceeded with; and the Bill empowering the Company to raise £80,000 additional capital, with borrowing powers of £20,000, to construct much-needed storage reservoirs to meet the growing demands of the district for water for manufacturing purposes, has received the Royal Assent.

At the recent annual general meeting of the Kidsgrove Gas Company, the Directors reported that the sale of gas reached 19,567,500 cubic feet in the past twelve months, as compared with 17,086,100 cubic feet in the previous year. They recommended the usual dividends. The Chairman (Mr. J. Gater) remarked that this was the 41st anniversary of the formation of the Company, and during the whole of this time the shareholders had received as large a dividend as the law allowed. This, however, had not been done at the expense of the consumers, for the price charged for gas had been reduced. The report was adopted.

The ordinary general meeting of the Leatherhead Gas Company was held on the 11th inst.—Mr. G. Brown in the chair. The report for the year ending June 30 showed that the profit amounted to £789; and the Directors recommended the payment of a further dividend of 2 per cent.—making, with the interim dividend, 4 per cent. per annum. To meet the expenses of carrying out the works referred to in the report of the Engineer (Mr. F. S. Cripps), the Directors decided to increase the capital by issuing £1800 of 3½ per cent. debenture stock at par. This had been done, and the stock was readily taken up by the shareholders. Mr. Cripps reported that the supply of gas had been satisfactorily maintained, while several improvements at the works had been effected. About 1600 yards of 6-inch, 2300 yards of 4-inch, and 1000 yards of 3-inch mains had been laid during the year, principally in connection with the supply of gas to Mickleham and Great Bookham. The revenue account showed that the manufacture of gas, including £1511 for the cost of coals, absorbed £2563; the total expenditure being £3503. The gas sold to private consumers realized £3462, less £347 for discounts allowed; public lamps brought in £397; rental of meters and cookers, £105; and residual products, £663—making, with smaller receipts, a total of £4292—leaving the balance of profit as above stated. In moving the adoption of the report, the Chairman congratulated the shareholders on the continued steady increase of business, and on the prospects of the Company. During the year 2210 tons of coal were carbonized—being an increase on the preceding year of 233 tons; and compared with the last report there was a net increase of £216 in the receipts from gas and residuals. There was still an extended demand for gas cooking-ranges, and prepayment meters. At the present time there were 75 ranges on hire, and 106 prepayment meters in use. The report was adopted.

Next Tuesday the Morecambe Gas Company will hold their twentieth annual meeting, when the Directors will report a continued increase in the amount received from the sale of gas. In the twelve months ending June 30, it was £8822, about £2000 of which was for gas used for cooking and heating purposes; and the total revenue was £10,958. The expenditure being £7231, the balance carried to the profit and loss account is £3727. The amount of profit available for dividend for the year is £3317; but as £1200 was used in paying the interim dividend, there is left a sum of £2117, which will enable the Directors to recommend the payment of a dividend of 6 per cent. for the past six months; making 12 per cent. for the year. The enlargement of the retort-house, and the introduction of the regenerative system of heating, were carried out during the twelve months covered by the report; and in the current year the purifying plant will have to be increased. Under the supervision of Mr. W. Duff, the Company's Secretary and Manager, 6029 tons of coal were carbonized last year; the make of gas being 55,052,000 cubic feet, of which 52,660,900 cubic feet were sold. The estimated

quantities of residuals were: Coke, 3665 tons; tar, 91,939 gallons; ammoniacal liquor, 146,000 gallons.

The Peterborough Gas Company have again declared full maximum dividends for the last half year; the profit during this period closely approaching £3000. They have now on hire 270 gas cooking-stoves and 113 prepayment meters. When the Company took over the works 30 years ago, the unaccounted-for gas amounted to 23 per cent. on a make of 30 million cubic feet. The leakage is now only 7¼ per cent. on a make of more than 100 millions. The shareholders accorded hearty votes of thanks to the Chairman (Mr. W. Harris) and Manager (Mr. J. Barton).

The half-yearly meeting of the Pontefract Gas Company was held last Friday—Alderman J. Taylor presiding. The usual maximum statutory dividends of 10 per cent. per annum on the original shares, and of 7 per cent. per annum on the new ordinary shares, were declared. A slight increase in expenditure had been more than counterbalanced by increased revenue; thus enabling the dividends to be paid without trenching on the reserve fund, which now amounts to £2589 16s. The quantity of gas sold during the past half year was 18 million cubic feet.

The Rochester, Chatham, and Strood Gas Company held their ordinary half-yearly meeting on the 11th inst.—Mr. Thos. Winch, Chairman of the Company, presiding. In their report, the Directors recommended that a dividend at the rate of 10 per cent. per annum on the "A" and "D" shares, and of 7 per cent. per annum on the "B" and "C" shares, should be declared. They also stated that the demand for gas continued to steadily increase; and in order to cope with it, the Directors had considered it necessary to materially increase the manufacturing power at the Gillingham works. For this purpose a contract had been entered into for the supply and erection of additional plant, capable of producing 500,000 cubic feet of gas daily. The report was adopted.

The accounts presented at the half-yearly meeting of the Scarborough Gas Company last Saturday, showed that the sale of gas in the six months ended June 30 produced a revenue of £14,778; residuals brought in £3144; and the total receipts were £18,967. The expenditure being £13,370, there was a sum of £5597 carried to the profit and loss account. The amount available for division was £6130; and after payment of the maximum dividends, which the Directors recommended, there was a balance of £357 to be carried forward. Extensions of the manufacturing plant are progressing, under the supervision of the Company's Engineer and Secretary (Mr. J. Holliday); and for the purpose of meeting the outlay thereon, additional capital is to be called up. In the six months covered by the report, 10,539 tons of coal and cannel were carbonized. Of the total quantity of gas produced and in store, 99,618,600 cubic feet were sold to private consumers, and 9,319,449 cubic feet for public lighting. The estimated production of residuals was: Coke, 6323 tons; tar, 646 tons; ammoniacal liquor, 1128 tons.

The annual general meeting of the Truro Gas Company was held last Tuesday—Mr. J. James in the chair. The sale of gas produced £5615, as compared with £5809 in the year ending June 30, 1897; the difference arising from a reduction in price, and not from diminished consumption. The price of coal increased last year from £2658 to £3185 owing to the coal strike in South Wales. The balance on the profit and loss account was £1769; and it was appropriated as follows: Dividend of 6 per cent., £960; addition to reserve, £200; carried forward, £609.

The half-yearly meeting of the Wakefield Gas Company was held on Monday last week—Dr. Statter, J.P., in the chair. The notice convening the meeting having been read by the Secretary (Mr. W. H. Parker), the report, with the accounts for the six months to June 30, was presented. The accounts showed that the sale of gas had produced a revenue of £13,045; residuals brought in £3018; and the total receipts were £16,946. The expenditure on the manufacture of gas was £7861; on its distribution, £1375; and on management, £587—the total expenses being £11,059. The balance carried to the profit and loss account was £5887; and the amount available for distribution was £7108. The Directors recommended the payment of the usual dividends—viz., 11½ per cent. per annum on the £25 and £5 shares, 9 per cent. per annum on the "B" fifths £5 shares, and 8½ per cent. per annum on the new ordinary shares, all clear of income-tax. The Chairman went through the various items in the accounts, which he considered very satisfactory. He reminded the meeting that services were now put in free, and that in the past half year the gas had been sold at 2d. per 1000 cubic feet less than in the corresponding period of 1897, which meant a loss to the Company of £870. Notwithstanding the abnormally mild winter and the introduction of the electric light by the Corporation, there had been an increased consumption of nearly 1 million cubic feet. During the ensuing half year, the Company would have to face an increase of 10 per cent. in the cost of coal, while tar had fallen in value about 16 per cent. The Workmen's Compensation Act, which came into force on July 1, would also involve additional expenditure; but the Directors hoped to pull through with the price of gas at the reduced rate. In May last a series of cookery lectures were given at the offices of the Company; and as they were very well attended, it had been decided to have a further series in October next. He concluded by moving the adoption of the report; and the motion was carried. On the motion of the Chairman, seconded by Mr. Howden, it was resolved to pay the usual dividends. The retiring Directors (Dr. Statter, J.P., and Mr. G. H. Roberts, J.P.), and Auditor (Mr. C. Hopkinson) were then re-elected. A vote of thanks was accorded to the Chairman for presiding, and to the Directors for their attention to the business of the Company. In acknowledging it, the Chairman proposed in generous terms the usual complimentary vote to the staff, which was acknowledged by the Engineer (Mr. H. Townsend) and the Secretary (Mr. Parker).

The Waltham Abbey and Cheshunt Gas Company sold 8,843,700 cubic feet of gas to private consumers, and 1,413,000 cubic feet for public lighting and under contracts, in the six months ending June 30; producing a revenue of £2000. The total receipts were £4054, and the expenditure was £2607; leaving a balance of £1447. Deducting £150 carried to the suspense account, there was £1297 to go to the profit and loss account. The Directors, at the half-yearly meeting next Friday, will recommend dividends at the rate of 7 per cent. on the original, and 5 per cent. on the additional capital, after payment of which and the debenture and stock interest there will be a balance of £925 to be carried forward. The shareholders will be asked to sanction the issue of £10,000 of additional share capital and £3125 of debenture capital under the Company's Order of 1881. Under the management of Mr. W. B. Randall, the works turned out 17,242,000 cubic feet of gas, of which 16,733,000 feet are accounted for.

The annual report of the Directors of the Wigton Gas Company, Limited, states that improvements and additions to the works have been carried out at a cost of £300, and the works are now in a better and more efficient condition than they have ever been. A dividend at the rate of 15s. per £10 share (fully paid up) is recommended. Mr. J. Hepworth, the Company's Consulting Engineer, states that the deficiency in the quantity of gas sold could be more than made up—as has been the case in other towns—if the prepayment meter system were further extended. During the past financial year, the quantity of gas made per ton of coal averaged 10,000 cubic feet, which, with the coal purchased, was good work; but he would not be satisfied to see a lower result. It would be necessary to increase the storage at no distant date, at a cost of £700.

The report of the Winchester Water and Gas Company which will be presented at the half-yearly meeting of the Company on the 30th inst., states that the receipts on revenue account amounted during the six months ending June to £9823, and the expenditure to £6137; leaving £3686 to be carried to the profit and loss account, and making the balance of that account £6251. The Directors recommend the payment of dividends at the rate of 10 and 7 per cent. per annum, less income-tax, on the original and new capital, for the half year. The contract for lighting the public lamps will expire on the 1st of November; and a fresh one has been entered into for three years from that date. In the first half of 1897 the receipts on revenue account were £9970, while the expenditure was £5982, leaving a balance of £3988.

The half-yearly general meeting of the Yeadon and Guiseley Gas Company was held last Wednesday—Mr. W. King (Vice-Chairman) presiding. The Directors' report for the half year ended June 30 showed an increased consumption of about 1½ per cent. This was satisfactory, especially when it was considered that mild weather prevailed during January and February, and also that the mills were still almost practically closed, so far as the consumption of gas was concerned. The ordinary house and shop consumers continued to increase steadily; and during the six months 61 ordinary and 54 automatic prepayment meters had been added; bringing up the total number of "slot" meters now in use to 164. The average consumption of gas by these meters was equal to 10s. 4½d. per meter. The receipts for the six months showed an increase of £108 9s. 1d. upon those of the corresponding period of last year, and the expenditure also showed a rise of nearly £400; this being mainly accounted for by the rebuilding of retort-benches. After the payment of the usual dividends there was left a balance of £110 13s. 7d. During the half year, 3424 tons of coal had been used, at an average cost of 10s. 10½d. per ton, as compared with 3500 tons, at 10s. 10½d., for the corresponding half of 1897. The gas made was 31,655,000 cubic feet. The report was adopted, and the maximum dividends—10 per cent. per annum on the consolidated stock, and 7 per cent. on the new shares—were declared.

Water Companies.

The Brompton, Chatham, and Gillingham Water Company held their half-yearly general meeting on the 11th inst.—Mr. John Baird, the Chairman of the Company, presiding. The report of the Directors stated that the gross income for the half year amounted to £10,252, of which £1212 had been returned to customers as discount and allowances. The aggregate number of tenants standing on the books was 17,434,294; new supplies, representing an annual rental of £235, having been connected with the mains during the half year. In order to meet the demand for water, the Directors had had to lay an additional 1906 yards of mains to the several building estates now being developed. The new covered reservoir had recently been tested, and found perfectly solidified; and the Directors thought the work reflected great credit on the Contractor (Mr. Herbert Weldon) and the Company's Engineers (Messrs. J. Taylor, Sons, and Santo Crimp) who designed it. The Directors also reported that the Bill for conferring further powers upon the Company had passed; and that the Company were treating for the purchase of extra land at Luton to extend their works. They recommended a dividend at the rate of 10 per cent. per annum, free of income-tax. The report having been adopted, and votes of thanks passed to the Chairman and Directors, Auditors, Secretary, &c., an extraordinary meeting followed, at which it was resolved to issue 2000 new 7 per cent. shares.

At the recent half-yearly meeting of the Stockport Water Company, the Directors reported that the profit amounted to £9390. This sum, with the balance brought forward, made up £10,550, out of which it was proposed to pay a dividend at the rate of 7 per cent. per annum. The Chairman (Mr. G. H. Hill) said the water-rents in the Stockport district showed steady progress; while in Alderley, where building operations were going on, there was also an increase. Two items of expenditure, amounting to about £300, had been charged to revenue which might have been placed to the capital account. The works had been maintained in good condition, and the revenues were steadily increasing. Both the dividend and the balance carried forward had augmented. The shareholders were not obtaining a 7 per cent. dividend by the manipulation of figures, but on a really sound and reliable basis. The Directors preferred making steady progress to having a fluctuating dividend. The report was adopted.

At the recent annual general meeting of the Wrexham Water Company, the Chairman (Mr. W. Overton, J.P.) stated that £4344 had been expended on capital account during the year; the greater portion—£3049—being on account of the new service reservoir and contingent works. The receipts from all sources continued to grow; £8031 having been received—being £214 more than last year. The working expenses were slightly higher than last year; being £1984, as against £1924. The excess of £60 is largely made up of the increase in rates and taxes, over which the Company had no control. Filtration charges were also slightly higher, owing to the larger quantity of water filtered, and the more frequent cleansing of the filter-beds. During the year, water had been laid on to 212 houses, making a total of 5276 houses supplied. The other items did not call for comment; being practically the same as in preceding years. The result of the year's working was that the Directors were in a position to recommend a dividend at the rate of 6 per cent. per annum upon the consolidated stock, as against 5¾ per cent. last year. The *pro ratâ* dividend on the ordinary shares would therefore be £4 4s. per cent., being seven-tenths of that paid upon the consolidated stock. The report was adopted.

LORD GREY ON THE ADVANTAGES OF INDUSTRIAL CO-PARTNERSHIP.

At the Crystal Palace last Friday, Lord Grey opened a flower show in connection with the National Co-operative Festival, and subsequently delivered an address as President of the Festival for the ensuing year. In the course thereof, he remarked that the co-operators of the Southern Section had supplied an example which those of other sections would do well to copy. They had now held for eleven years a festival of a character well calculated to impress the popular imagination, and to bring home to the hearts and minds of all co-operators the conviction that the efforts of true co-operation should not be confined to selfish attempts to increase the dividends of a distributive store, but should aim at developing the moral and social side of co-operative life. The promoters of the festival recognized that the sole object of co-operation was not to increase the dividends of distribution. That object was important; but it would take care of itself. The selfishness of human nature might be relied upon to look after a movement which secured last year for co-operators the magnificent profit of £6,617,000. That a purely working-class organization should have been able, within the limits of the present reign, to establish and conduct a business on lines which enabled its members to divide among themselves these enormous profits, was a fact which yielded to no other, even in this wonderful age, in either importance or hopefulness. It was certain that the annual profits would quickly grow from £6,617,000 to £12,000,000 and even more. It was therefore evident that co-operators, having, by the application of common sense to the business of distribution, effected a saving on their purchases which was equivalent to an increase of 7½ to 12½ per cent. upon their wages, could now afford to give some attention to the consideration of problems which had for their object the development of the individual character and social life of their members. The object of the festival was accordingly to focus the attention of co-operators, not on the commercial side of the movement, but on such arrangements as would enable the 1½ million co-operators to turn their attention to problems which had for their object the development of their individual character and social life. After enumerating the advantages conferred by co-operation, Lord Grey said the achievement of these results suggested the inquiry whether it would not be possible, by kindred organizations, to obtain permanent advantages of a similar kind for co-operators in every centre. He was satisfied that towns such as Leeds and Leicester, which were honourably distinguished for the vigour with which they were applying the principles of co-operation, would agree that Kettering at the present moment had the right to be regarded as the first co-operative town of the kingdom. It was a comparatively small town with about 25,000 inhabitants, of which number 5785 (which meant practically the whole male adult population) were members of co-operative societies. In addition to a most successful distributive store, it had six manufacturing co-partnership societies, the most important of which had succeeded, for some length of time, in paying out of profits an average interest of 7½ per cent. on the share capital, and a dividend to labour of 7½ per cent. on Trade Union rates of wages. The present weakness of the co-operative movement was that it had degenerated too much into a hunt after dividends. As practised by the English Wholesale Society, co-operation lacked the qualities which were necessary to stir the soul. If co-operation was to become a living force in moving the character of the nation along an upward plane, it must return to the spirit of its founders, and show that it had a soul above a shopkeeper's. They stood that day on the threshold of the movement. It was only now beginning to be recognized, both by labour and capital, that the principles of co-partnership, which insisted that labour should have an equal share with capital in the surplus profits that might remain after the initial obligations to capital had been discharged, were fair to all parties; and that the worker should be allowed the option of investing his profits in the shares of the company which employed him, and of thus acquiring the right to take his part, like any other shareholder, in the management of its affairs, was fair to all parties, and absolutely just; and, further, that expediency no less than justice demanded that these principles should be applied wherever possible to industrial enterprise, so that the non-interested hireling might become the interested partner. Let them look forward for a moment and consider the advantages they were justified in anticipating would result from the adoption of a system which divided the net profits between capital and labour in such a way that £1 of wages should receive as much as £1 of dividend, or, in other words, in proportion to the value of their respective services, and allowed the workers to invest their profits in the business which employed them. The first great result they might confidently anticipate from the movement was the establishment of a solidarity of interest between labour and capital, with, consequently, increased security against the recurrence of industrial wars. The fact that the employees of the South Metropolitan Gas Company had, during the ten years since the principle of co-partnership was adopted, invested £110,000 of their savings in the Company, coupled with the further fact that the stock of the Company was considered the best security of all the gas stock in the market—being bought at prices which yield to the investor only £3 12s. to £3 16s. per cent., while none of the other Gas Companies' stocks were bought to yield a smaller return than about 4 per cent.—would appear to be conclusive evidence on this point. Mr. George Livesey informed him that the experience of the South Metropolitan Gas Company was that it was now the practice to discuss questions with the workers which formerly could not be discussed at all, because of the suspicion with which employers were regarded by the workers; and that the chance of a strike no longer entered into their consideration. In the Gas Company which Mr. Livesey was managing on co-partnership principles, 3 per cent. more gas was sold with 4 per cent. less coal used; and the reason for this greater efficiency obtained at smaller cost was that the worker, being a partner and not a hireling, had the heart of a friend and not of an enemy towards the work on which he was engaged. He (Lord Grey) therefore regarded the interesting exhibitions of products manufactured by co-partnership societies as the most important and significant feature of that festival. The example offered by the action of 1½ million working-men co-operators, in their collective attitude as employers of labour, could not fail to have the greatest influence. In which direction should that influence be used? Should it be said that the influence of the wholesale had been used to stem back the inevitable change decreed by the resistless law of social evolution? or should it be said, in after time, that the workingmen co-operators of England were the first to introduce into our industrial system principles which, if applied elsewhere as they were already successfully applied at Leicester, Kettering, Huddersfield, and Hebden Bridge, could not fail to improve the character, status, and efficiency of the worker, and consolidate the interests of labour and capital; thereby strengthening the nation both in character and wealth?

A vote of thanks to Lord Grey for his address was cordially passed.

THE PLYMOUTH CORPORATION AND THE GAS COMPANY.

Further correspondence has taken place through the Plymouth daily papers between Mr. J. A. Bellamy, the Deputy-Chairman of the Gas Company, and Alderman C. H. Radford, respecting the policy of the Corporation in opposing the Gas Company's recent appeal for further parliamentary powers. Replying to the letter of Mr. Bellamy, which was summarized in last week's "JOURNAL" (p. 389), Alderman Radford contended that the opposition to the Company's Bill of 1894 was justified, not only because an increase of a candle in the illuminating power of the gas was obtained, but because the Company failed in their endeavour to obtain power for the supply of electricity in competition with the Town Council. With regard to the opposition to the Company's Bill in the last session, Mr. Radford says that, though a petition was lodged, a settlement was arrived at by interviews and correspondence between the Town Clerk and Mr. Shelly, the Solicitor to the Company; and Mr. Shelly did not support the contention of the Chairman of the Company that the opposition had put them to any considerable expense. In answer to this, Mr. Bellamy wrote: "My contention was that the ratepayers' money was wasted, and loss caused to the Gas Company and to the consumers, by the excessive eagerness of the Parliamentary Committee to fight, whereas all reasonable requirements of the Corporation as protecting the shareholders' interests could almost always be obtained by friendly negotiations. I have seen no reply to this. I am informed that in 1894 the Special Purposes Committee made no serious attempt to negotiate. The results obtained were ridiculously small, and could have certainly been obtained without any fighting and the incidental expense. The Gas Company withdrew the electric lighting clause without argument. They had been supplying 15-candle gas for years; and the Committee made it obligatory." With reference to the remark of the Chairman of the Company that the action of the Corporation cost the Company about £1000, Mr. Bellamy says: "I have made inquiries, and find that the opposition of the Parliamentary Committee was continued until after the Company's Solicitor had left for London in connection with the hearing of the Bill by the House of Commons Committee. Several expensive expert witnesses had been retained; their evidence prepared in Plymouth and sent to Parliamentary Agents; long briefs thereon prepared and handed to Counsel, with the corresponding fees; and some of the witnesses requested to be in London; consultation with Solicitors and Counsel with regard to all this evidence to meet the Corporation opposition. I may say that £132 10s. has been paid to one of these witnesses, which may be taken as a type of the other payments." Alderman Radford returned to the matter in a letter published last Friday, in which he repeated his contention that the action of the Corporation towards the Company has been neither factious nor unfair; and he claims that it is the duty of the Corporation to carefully watch the interests of the people as against the owners of a valuable monopoly. He suggests that the "question of costs and the misunderstanding as to the withdrawal of the petition may well be left to the legal gentlemen concerned." As the whole controversy has turned upon the question of these costs and the responsibility of the Town Council for their being incurred, this suggestion is remarkable, to say the least of it.

THE PROPOSED PURCHASE BY THE CORPORATION OF THE FALMOUTH GAS AND WATER WORKS.

A Statutory Meeting of Ratepayers to be Called.

At the Meeting last Thursday of the Falmouth Town Council, the Gas and Water Purchase Committee presented a report, in which they recommended that the requisite statutory meeting of the Council be called forthwith, to consider and to decide as to the expediency of promoting in the next session of Parliament a Bill to enable the Corporation to purchase the undertaking of the Falmouth Gas Company, under the terms of section 69 and 70 of the Falmouth Gas Act, and either by agreement or otherwise to purchase the undertaking of the Falmouth Water-Works Company. The Committee were of opinion that the revenue from the two undertakings would be sufficient to redeem the purchase within a "reasonable period;" but if the Council desired more definite information on this point, they suggested that an expert should be called in.

The adoption of the report was moved by Mr. GROSE, and seconded by Dr. HARRIS.

Mr. Fox was not in favour of the purchase of the gas-works; and he could not say that he was in favour of the compulsory purchase of the water-works. At any rate, they ought to consult the ratepayers before committing themselves. He believed that the purchase of the water-works would mean an increase in the rates. They would either have to increase the present charges, or make an increase in the rates. Until he knew the wish of the ratepayers, he should oppose the scheme.

Mr. DUNNING observed that Mr. Grose had stated that the profits on the gas would defray the deficiency on the water; and he asked, was Mr. Grose aware of the sum that would have to be paid for the acquisition of the gas-works? They ought to go to the ratepayers first.

The MAYOR: The mode of procedure we propose to adopt to-day provides for that.

Mr. MEAD said he had facts and figures bearing on what Mr. Fox had alluded to; and he felt sure that if Mr. Fox would study them he would alter his opinion.

Dr. BANKS said he was strongly in favour of the water-works being acquired, even if a financial loss accrued, because it was very important

that the town should control its own supply. As there was only one year left during which the ratepayers could exercise their option of compulsory purchase, he did not conceive that he had any right now to vote against it, and by so doing prevent the ratepayers from exercising their choice. They would have the right in future to complain if the Council prevented them from exercising their option. Without, therefore, expressing any views for or against the purchase of the gas-works, he should vote for a meeting being held, to give the ratepayers a chance of recording their opinion. He wished to know what the report really meant respecting the employment of an expert.

Mr. MEAD: The Committee wish to leave the matter an open question; the Council could appoint an expert or leave it to the Committee.

Mr. BOWLES expressed regret that the Committee had thought it necessary or advisable to include both undertakings in one form of resolution. If they had separated them, he should have voted for the purchase of the water-works. If the Committee wished to appoint an expert, they must first tell the Council who it was to be. He did not agree to the employment of Mr. Silverthorne. It would not be a wise mode of procedure to empower the Committee to employ an expert.

Dr. HARRIS said it was a very big business the Council were going in for; the question of choosing an expert rested entirely with the Council, and not with the Committee.

Mr. MACKENZIE pointed out that the Committee were distinctly in favour of the Council dealing with this question. He certainly favoured the employment of a gentleman who had already provided two reports. They were aware that the gas-works were owned by a certain number of shareholders who got large dividends; and two of the shareholders were members of the Town Council. Now, human nature was all the world over human nature; and these shareholders, being in possession of what was a little "gold mine," had no sympathy with the movement in favour of acquiring it. The raid on Johannesburg was much the same as the attempt to get the gas-works. That the concern was a profitable one, there could be no doubt; and the duty of the Council to the ratepayers was to purchase it. He had heard a great deal to the effect that the profits on the gas supply were not available for the reduction of the rates. They knew, however, that all interest on fresh capital could be handed over to the Finance Committee. In his opinion, they would be neglecting their duty if they allowed this opportunity to slip.

Mr. BOWLES said he should not vote against the proposal, if it were understood that no expense would be incurred except what was necessary to obtain the opinion of the ratepayers.

The motion was thereupon put, and carried by 9 votes to 2—with one councillor neutral.

Dr. BANKS next moved that the Committee be asked to consider and report to the Council at as early a date as possible what expert it was advisable should be employed. He favoured the employment of an expert, because he did not see how they could go to the ratepayers and put the matter before them unless they had some distinct information to give them. Mr. Silverthorne's last report would have to be altered, chiefly on account of the difference in the price of gas since the report was drawn up.

The proposal was assented to.

THE RECENT ALLEGED IRREGULARITIES AT THE PERTH GAS-WORKS.

It may be remembered that some time since a Special Committee was appointed by the Perth Gas Commissioners to inquire into a claim by Mr. G. P. K. Young, architect, for £112 for work performed in connection with the new gas-works, and generally as to the management of the gas-works. The Committee had several meetings; and last Tuesday they came to a unanimous finding.

They are of opinion that both Bailie Wright, the ex-Convener of the Works Committee, and Mr. A. Wilson, the Manager, "have acted in a culpably careless, negligent, and unbusiness-like way; that they should be censured by the Commissioners; and, further, that Mr. Wilson be cautioned that in the event of his being guilty of similar laxity, or showing want of attention in the performance of his duties as Manager, he will be asked to resign." It is stated that, in connection with the inquiry, Mr. Young, Mr. James Easson, the late Assistant Gas Manager, Bailie Wright, Mr. Andrew Wilson, the Manager, and Mr. James Wynne were called before the Committee and examined. Mr. Young said that he received instructions from Mr. Wilson to prepare certain plans, sections, and specifications; and the work was executed according to them. He understood that he was doing the work for the Gas Commissioners. Bailie Wright asked him about the work several times, and urged him to get on with it. Bailie Wright admitted that, in a general way, he had given authority to Mr. Wilson to ask Mr. Young to check his levels and measurements; but he understood that this would not cost more than a pound or two, and would be paid by the contractor. He did not authorize the employment of Mr. Young to prepare plans, drawings, sections, or measurements of the intended works. Mr. Wilson said that while the staff in the drawing-office were busy with the plans for the levelling of the ground, and had completed one set of the sections, they were so pressed with work that he brought the matter under Bailie Wright's notice, and further mentioned that the work should be done by a surveyor rather than a gas engineer. Bailie Wright approved of a surveyor being engaged; and he authorized that Mr. Young should be asked to do the work. Acting on this authority, the work was put into Mr. Young's hands; and he prepared plans, sections, and specifications, which were accepted by the Gas Commission, and the work was carried out according to them. Bailie Wright often complained of delay. When the plans, &c., were finished, they were placed on the drawing-table of the gas-office for inspection. Mr. Wilson did not remember specially calling Bailie Wright's attention to them as Mr. Young's work. Mr. Wynne's evidence was similar to that of Mr. Wilson. Mr. Easson said that on one occasion, when some of Mr. Young's assistants appeared, Bailie Wright asked him what they were doing there; but he could not tell him.

The Committee say that, on a careful consideration of the evidence, they are willing to believe that Bailie Wright was not aware that in acting as he had done he had authorized anything further than the checking of the plans, &c., which Mr. Wilson had prepared and shown him; but they could not free him from blame for not ascertaining more carefully and fully what was actually proposed to be done, and submitting the matter for the approval of his Committee. The Committee think that Mr. Wilson was remiss in not ascertaining what Mr. Young's charge would be for the work, and submitting the whole matter in a more complete and careful manner to Bailie Wright for instructions before actually employing Mr. Young. The Committee consider that Mr. Young's conduct in the whole matter has been perfectly straightforward and business-like; and the Gas Commission having adopted his plans, sections, and specifications, and carried out the work according to them, they cannot resist the conclusion that Mr. Young's account must be paid by the Gas Commissioners.

The report of the Committee will come up for the consideration of the whole Commission at their first meeting. But meanwhile rumours are current, says the "Dundee Advertiser," that another alleged irregularity is at present under consideration of the Commissioners, in connection with the expenditure on the annual trip to the employees.

THE GAS SUPPLY OF SOWERBY BRIDGE.

A Local Government Board Inquiry.

On Wednesday last, Colonel A. J. Hepper held an inquiry on behalf of the Local Government Board respecting an application by the Sowerby Bridge Urban District Council, for permission to borrow the sum of £8500 for gas-works purposes at Sowerby Bridge and also for their gas supply to the Luddendenfoot district. It was given in evidence that the rateable value of the district was for poor-rate purposes £47,339, and for district-rate purposes £43,734. The present district-rate was 2s. 6d. in the pound; and the poor-rate, in which was included the school-board rate, was 2s. 8d. in the pound. The estimated population was from 11,500 to 12,000, as compared with 10,408 in 1891. The Council's unexhausted borrowing powers amounted to £18,296. The loans on the gas-works still unpaid were £34,612. The price of gas to district consumers was 2s. 3d. per 1000 cubic feet, and to outside consumers 3s. 1d. For the gas supplied from the Luddendenfoot works 3s. 6d. per 1000 feet was charged. In each instance a discount of 10 to 15 per cent. was allowed for cash. The works at Luddendenfoot (formerly owned by a private firm, Messrs. Whitworth) were acquired by the late Local Board under a Provisional Order in May, 1887. By the terms of the Order the Board were empowered to construct and possess gas-works outside the Sowerby Bridge district. The district was a growing one—buildings were springing up on every hand; and to remedy complaints that were being continually received about the inadequate supply of gas, it was necessary that extensions should be carried out. Some portions of the works had already been completed, at a total cost of £2132. Owing to the development of the Pye Nest estate, gas-mains would have to be carried there. The prospective works included in the application were intended to be carried out during the next two years. Included in these was an extension of mains to Salterhebble, which was at present supplied with gas from Halifax. At the Luddendenfoot Gas-Works the amount of gas manufactured was 17 million cubic feet per annum, as compared with 7 millions when the works were taken over in 1887. Some further evidence having been given by Mr. James Marsland, the Gas Manager, Mr. J. W. Lodge (a member of the Gas Committee) said that to put down plant at Luddendenfoot would be an absolute waste of money, since holder capacity and purifying capacity were both deficient there. He also objected to the proposal because when the mains were laid from Sowerby Bridge to Luddendenfoot the gas required there could be supplied direct from the Sowerby Bridge works. The Inspector said he would state Mr. Lodge's views of the position in his report; but he remarked that nobody present appeared to take Mr. Lodge's view of the matter. The Inspector visited the Luddendenfoot works at the close of the inquiry.

THE PROPOSED REGULATIONS FOR LAMPS AND SIGNS.

As mentioned in the editorial columns of the "JOURNAL" on July 5, the London County Council purpose exercising the powers conferred upon them by section 164 of the London Building Act, 1894, to make bye-laws for "the regulation of lamps, signs, or other structures overhanging the public way not being within the City." At first sight it might not be thought that authority of this nature could be construed by even those possessed of exaggerated imaginations into a significance of any great import to manufacturers, engineers, and traders in general from all parts of London. But when consideration is given to the draft bye-laws, it will be found that some of the proposed regulations are of such a nature as to excite surprise. It is unnecessary to refer in detail to the bye-laws, of which there are twenty, since the selection of two relating to lamps and supports will be ample for the purpose of showing the manner in which the County Council intend to treat many thousands of firms and individuals outside the precincts of the City. The third bye-law provides that "no lamp, or structure supporting or carrying the same, shall, after the confirmation of these bye-laws, be fixed or retained so as to overhang the public way in such manner that such lamp or structure, or any part of the same respectively, shall be at a less height than a clear 10 feet above the surface of the footway immediately under such lamp or structure, or be nearer to the carriageway than 3 feet from the outer edge of the kerb." If this proposal be carried into effect, it will necessitate the removal of at least 90 per cent. of the existing lamps; while if read in conjunction with the fourth bye-law, fixing the size and weight of the lamp, the result will be either the entire abolition of many thousands of lamps at present in use, or the substitution of new ones at a heavy outlay. It is estimated that the enforcement of these regulations would entail an aggregate expenditure throughout the Metropolis of no less than £1,500,000; and if this assumption be correct, no surprise need be manifested at the repugnance exhibited towards them. The eighth bye-law provides that "the owner of every lamp sanctioned under these bye-laws shall keep such lamp lighted during such hours as he shall be required so to do under the sanction therefor, or under any renewal of such sanction." In other words, the owner must either himself remain, or keep an attendant in waiting, up to a stated hour at night, in order to extinguish the lamp. It

is not surprising to find that some of the Local Authorities, including St. Pancras and Lambeth, strongly object to the three regulations in question; and if information could be obtained as to the attitude of the remainder, it would no doubt be ascertained that they are equally opposed to them. The "curfew" regulation is regarded as being arbitrary and unnecessary, and should be expunged; and it is suggested that the bye-law respecting the height of lamps should be modified so as to fix either 7 ft. 6 in. or 8 feet as the minimum vertical height of the lamp from the footway. The views of the Vestries and District Boards of Works are being, or will be, communicated to the County Council, who may perhaps be disposed to introduce such modifications in the draft bye-laws as will meet the circumstances of the case. But even if they are approved in their present form, they must of necessity obtain the sanction of the Local Government Board before they can become operative. Moreover, the regulations must be administered by the Local Authorities, who in many cases have pronounced adversely to some of them. This of itself would, no doubt, diminish to a large extent the strength of the weapon which the County Council seek to place in the hands of apparently unwilling recipients.

WATER SUPPLY IN THE DUKINFIELD DISTRICT.

The Greenfield Reservoir.

The Dukinfield District Council, the Hurst District Council, and the Ashton and Stalybridge Corporations, are joint owners of the very extensive water-works in the Greenfield Valley. These four bodies are therefore interested in the water undertakings in the locality; and any further expenditure upon the construction or extension of works has to be borne *pro ratâ* by each. About the year 1875, the Joint Committee entered the Greenfield Valley, and began to construct the present Yeoman Hey reservoir, and a flood tunnel to divert the drainage above Birchen Clough, of about 2000 acres, into Dovestone Clough, down which the water passes and forms the Greenfield Brook below the embankment of the Yeoman Hey reservoir. In 1876, the contract for the work was let for £88,500. The reservoir, aided by the flow of the streams from the drainage to it, gives a supply of about 1,100,000 gallons per day during a drought of about 150 days, after furnishing compensation water to the stream for the same period. The top-water level of the reservoir is 768 feet above Ordnance datum. The reservoir cost about £92,000. Last year the Committee decided to construct a second reservoir above Yeoman Hey, to be called the Greenfield reservoir; and the work is now in progress. The undertaking has lately been inspected by the members of the Dukinfield Council. On arriving at the site, the party were received by the Inspector of Works (Mr. Nowell) and the representative of the Contractors (Mr. Thorpe). The most interesting feature at this point is a puddle trench which is being constructed from one side of the valley to the other—a distance of 750 feet. It is 10 feet wide and upwards of 100 feet deep. The excavation for the trench is the most costly piece of work in the whole scheme. The Contractors have met with quicksands and other difficulties, which have compelled them to go down far below the original intended depth. The parliamentary estimate of the cost of the whole work was £32,840 exclusive of land; and the accepted tender was £39,812. The reservoir will be half-a-mile long; and it is calculated that it will hold 110 million gallons.

THE DRY WEATHER AND WATER SUPPLY.

Curtailment of the Water Supply at the East-End.

The long continuance of dry weather which has been experienced this year has necessitated the issue in various places of notices to the consumers to be careful in the use of water; and a few weeks ago the Bradford Corporation, as mentioned in the "JOURNAL" at the time, were compelled to shut off the supply during the night. A similar measure of precaution has, from the same cause, been forced upon the East London Water Company, who last Thursday issued notices to the effect that, as from yesterday, the water would be turned on twice a day for about three hours each time, and at as nearly as possible the same hours; and consumers were advised to fill any available vessels while the water was on, to use it only for strictly domestic purposes, and to avoid waste in any form. Moreover, persons were especially cautioned against using water for garden or other similar purposes. The notice has been issued in all the districts served by the Company; and the result has been a great outcry in the papers, and a rush to the Company's offices for explanations. These were readily furnished. The Secretary (Mr. I. A. Crookenden) was away from town; but his representative stated that the Company had studied the interests of their customers as much as possible, but under existing circumstances it was impossible for them to go on emptying the reservoirs. But for the storage reservoirs which were completed last year, the Company would have been compelled to give notice some time ago. He thought the six hours' service of water quite long enough if care were exercised; and while the water was on, it could be stored in all kinds of vessels. The outlook was not so black as it appeared, for with a good storm or two the Company would be enabled to quickly revert to the constant supply. The three hours' supplies twice daily would be given at as convenient times to the consumer as possible, but they would not be given at night. The Company's officials would do everything in their power to minimize any inconvenience the inhabitants of East London might be put to; but they had had no other alternative, under existing circumstances, than to issue the circular.

The Company's Chief Engineer (Mr. W. B. Bryan, M.Inst.C.E.) states that the present drought is the worst he has experienced for many years. During the great drought of 1893, the average rainfall for the period was 23 inches, while this year it has only been 17 inches. The flow in the River Lea is now less than has ever before been recorded. The East London Water Company had last session obtained an Act to make very large reservoirs up the Lea to cover about 210 acres. Most of the land has been obtained, and the rest of it will be purchased under compulsory powers; and then the contracts will be let out as quickly as possible. The new reservoirs will hold more than 1000 million gallons. The present reservoirs hold 1200 million gallons. If these new reservoirs had been constructed, the Company would have been able to supply an extra 10 million gallons per day for another hundred days. The Company are now pumping nearly 11 million gallons from deep wells, and are obtaining 10 million gallons from the Thames. The balance is drawn from the Lea and the reservoirs. The New River Company are supplying the East London Company with as much water as they can spare—amounting to from 4 to 6 million gallons. The New River Company are permitted to take first from the river about 22½ million gallons per day; while the East London Company have to take what they can get. The deficiency in water supply is not confined to London. A similar state of affairs is being experienced at Bradford, Edinburgh, Croydon, and other places; and these supplies are under the control of the Local Authorities. The downfall of rain on Wednesday night was altogether inadequate. The amount registered was only 0·03 inch—in other words, the amount would not have submerged a sixpenny-piece lying on its face. Summer rains are considered practically useless. At the present time there is no deficiency; but the reservoirs have been drawn upon to such an extent that it is prudent to conserve as far as possible what remains, in case of further prolongation of the drought. A great deal of rain is required to bring the distribution up to the normal standard. The rainfall in the Lea Valley from June 30, 1897, to Aug. 19, 1898, was only about 18½ inches, instead of about 27 or 28 inches; and only 6½ inches fell in the six winter months, October to March, instead of about 14 inches. The usual quantity of water allowed per person daily is about 33 gallons; but, under the new regulation, this will be reduced to about 25 gallons. The regulation will not be enforced a day longer than can be avoided.

The unusually slight rainfall has affected the Thames Valley as well as that of the Lea. In their last report on the Metropolitan Water Supply, Sir W. Crookes and Professor Dewar state that the rainfall at Oxford in July showed a serious deficiency—being only 0·53 inch. The average fall in July for the past thirty years is 2·68 inches; showing a difference of 2·15 inches. On the 1st of the month, 0·22 inch of rain fell; also on five other days, but never so much as one-tenth of an inch. The total deficiency for the year is now 5·49 inches.

THE WATER SUPPLY OF CORK.

The City Surveyor of Cork (Mr. H. A. Cutler) has lately furnished the following particulars in regard to the water-works of the city. The water is pumped from the River Lee into two reservoirs. The high-level one has a capacity of 721,500 gallons, and supplies water to 17,760 persons; while the low-level one has a capacity of 3,404,000 gallons, and supplies water to 68,529 persons. The total pumping capacity is 403,767 gallons per hour; but with the exception of the two new American turbines, the whole of the pumping plant is wasteful and obsolete. The water at the intake is a good potable water, containing only 4·5° of hardness, and is an excellent water for domestic purposes; but in times of heavy rainfall large quantities of peat and decayed vegetable matter are brought down the river—causing great discoloration and deposits in the reservoirs, mains, and services. At the present time, plans are being prepared for the erection of filters. The quantity of water supplied for all purposes in 1896 reached the enormous amount of 71 gallons per head per day, with the result that the higher portions of the city were entirely without water except during the night and early morning. In 1897, most strenuous exertions were made to prevent waste with the result that at the end of the year the water supplied to the city for all purposes had been reduced to 48 gallons per head. The Deacon meter system was introduced, with satisfactory results; and an adequate staff of inspectors was engaged in inspecting house-services and serving notices. The valves were tested with the stethoscope, and noisy valves were located. The principal difficulties now encountered in further reducing the waste were the inadequacy of the service-pipes and house-fittings to withstand the increased pressure in the mains.

Newcastle Gas-Works Extensions.—The "Newcastle Chronicle" reports that the additions to the gas-works of the Newcastle and Gateshead Gas Company are now about to be proceeded with. The first contract—that for the gasholder tank—has been let to Mr. Walter Scott, of Newcastle.

The Public Lighting of Ditton (Widnes).—A recommendation of the Parish Council of Ditton, that arrangements should be made with the Widnes Corporation to light the roads of the district, being objected to by the ratepayers, was last Tuesday submitted to a poll. The result was a majority of 58 against the scheme.

Richmond (Surrey) Public Lighting.—The Richmond Town Council having complained to the Gas Company with reference to defective lights in the borough, a letter from the Company was received at the last meeting of the Council. They stated therein that they were not prepared to make any allowance with respect thereto. It was also pointed out that the evil complained of could not be due to the process of manufacture, which was in accordance with the latest and general practice. The Company considered that the Council could not be aware of the care and expense undertaken by them in order to minimize the number of defective public lights; and, further, that if a valid claim to an allowance could be made out, this would be met many times over by the improved lighting that had been provided in the most important parts of the town, for which no charge whatever was made to the Council. The Company represented that the number of lamps, or equivalent single lights, supplied by them exceeded by 80 the number actually paid for, which, at the statutory charge, would amount to £280 per annum; and the installing of the Denayrouze lamps in certain places had cost the Company about £150. The total number of defective lamps extending over the period mentioned was 349, of which the Brentford district accounted for 29; and it was further pointed out, as illustrating the comparatively infinitesimal money value of the lamps reported out and defective, that had the total number been 365 in twelve months instead of only 320 in thirteen months, it would at the most have only been equal to the charge for one lamp for twelve months—viz., £3 10s.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The ceremony of laying before the Town Council of Glasgow the accounts of the Corporation Gas Department for the past year, which took place on Thursday, was on this occasion shorn of much of its importance through the absence, on account of indisposition, of Mr. R. M. Mitchell, the Convener. Mr. Mitchell is, however, so much in touch with his department, and has such a strong regard for it, that from his retirement he sent a few notes on the business of the undertaking, which were read by the Deputy Town Clerk. These were to the effect that the report of the Committee for the year 1897-98 demonstrated continued prosperity in the department; and, notwithstanding the extension of the supply of electricity, the consumption of gas steadily increased—being nearly 3¾ per cent. over the previous year. It was thus demonstrated here, as well as in other large cities, that electric lighting and gas were by no means antagonistic. The works during the dark months had been taxed to the utmost; and the Committee were only sorry that the new gasholder at Dawsholm had not been executed so far in the manner expected, and that this delay might possibly deprive them of its use during the coming winter. The Council would observe that a new gas-works would be required to meet the ever-growing demand. The Committee hoped that suitable ground might be brought under notice very soon; but, of course, the Council would have every opportunity of criticizing and approving of everything connected with this large new undertaking. As explained before, the Dalmarnock Gas-Works were completely obsolete, and situated in what was now a densely-peopled locality. Besides, they were unsuitable for the introduction of modern labour-saving appliances; and economy in production in a new modern works, would go a great length to pay interest on their cost. Dalmarnock gas cost upwards of 2d. per 1000 cubic feet more than it did in their other works. Unfortunately, coal this year would cost a very considerable sum beyond last year's supplies; but, being anxious not unduly to burden the citizens, the Committee in the meantime had resolved that the price of gas should remain the same. Thanks were due to the Engineer for his continued attention to the works and general policy; also to the Works' Managers, Treasurer, and other officials. The Committee hoped that the record of prosperity in the Gas Department would continue, and even increase. Mr. W. Stevenson, Vice-Convener, moved the adoption of the report and accounts, which were agreed to without comment. The members of the Town Council, it is apparent, have every confidence in the Committee on Gas Supply.

The income of the Greenock Gas Trust during the past year amounted to £41,354; and the expenditure, to £40,019—leaving a surplus of £1335. Out of this the Police Board, as already mentioned, have appropriated £1000. On Tuesday, the Police Board approved of the accounts for the past year, and of the estimates for the current year, which show an expected surplus of £1040. Mr. Mitchell moved that the price of gas be reduced, as from the survey in May last, from 3s. to 2s. 11d. per 1000 cubic feet. Mr. Campbell, in seconding the proposal, said he thought they were entitled to congratulate themselves on the past year's working. Treasurer Anderson, seconded by Bailie Watson, moved that no alteration be made in the price, on the ground that the surplus was not sufficient to justify a reduction. The reduction was, however, carried by 14 votes to 6. This is a very suggestive incident. Where gas undertakings are managed by corporations with a free hand, the temptation to make profit for the municipality out of them is often too strong to be resisted. Where the corporations are restricted by statute to expending any surplus they may make from the gas supply on the undertaking itself, there is not this temptation; and, as a consequence, the gas-works have a better chance of success. The latter condition is mostly to be found where there are gas commissioners; and the former where the gas undertaking is controlled by a committee of the corporation. Such committees are less concerned with the prosperity of the gas undertaking than they are with the reduction of the police rates. Here, for instance, we have the Burgh Treasurer, who is the financier of the Corporation, seeming to bear a grudge against the Gas Committee that they had not a larger surplus. Complaint is often made that, as time goes on, legislation is becoming so grandmotherly that everything is regulated by Act of Parliament; and the subject is so hedged round by statutory regulations, that freedom is becoming a vanishing quantity. The control of the gas undertaking in Greenock furnishes an illustration of the need, in some cases, for stringent, and even microscopic, legislation, because it shows that where certain powers have authority, they do not scruple to use it miniously. Gas committees, or gas managers, placed as they are in Greenock, have little encouragement to do the best they can in the working of their department.

It is not quite pleasant reading; but it would be inadvisable not to communicate that the Special Committee of the Perth Gas Commissioners, who were appointed to inquire into the claim by Mr. G. P. K. Young, architect, of Perth, for £112 in respect of work done in connection with the preparation of plans for the new gas-works, and generally as to the management at the works, have completed their labours, and have come to a unanimous finding. (See p. 439.) The import of the evidence I need not give. My reading of it is that the Commissioners have gone about the whole proceedings in connection with the transference of the Corporation gas-works in such a blindfold way that it is no wonder mistakes have arisen. I do not know that they are even yet out of the wood in the matter. The so-called irregularities have been trumpeted loudly by the alleged discoverers of them. With the exception of Mr. Young's account, these irregularities have been mere trifles. This one seems to have been the result of a misunderstanding. Even it, I daresay, would not have been heard of, if there had not been a spirit abroad in the Commission to depreciate the late Convener of the Works Committee (ex-Bailie Wright), and all his work. The action of those who are responsible for much of an unpleasant nature which has occurred recently, seems to have been directed against a general policy, and to savour very much of an endeavour on the part of the tail to wag the dog. The Committee have agreed to recommend that Mr. Young's account be paid. Their report has yet to be considered by the Gas Commission; and the action of the Commissioners, when it comes before them, should be watched.

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 424.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	23¾—24½	..	4 5 9
100,000	10	„	7½	Do. 7 p. c.	16—17	..	4 8 3
300,000	100	July 1	5	Australian 5 p. c. Db.	105—107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd.	6¼—6¾	..	4 8 11
40,000	5	„	6	Do. New, £4 paid	4½—5	..	4 16 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280*	..	4 5 9
240,000	„	„	9	Do. New	210—215*	..	4 3 9
50,000	„	„	5	Do. 5 p. c. Prf.	140—145*	..	3 9 0
159,375	„	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig.	268—273	..	4 4 3
218,820	„	„	8½	Do. A. Ord. Stk.	195—200	..	4 5 0
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	127—132	..	3 15 9
420,000	20	Ma . 30	11½	British	53—55	..	4 1 9
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c.	25—27*	..	4 5 2
75,000	10	„	8½	Do. 7 p. c.	20—22*	..	3 17 3
500,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9—9½	..	6 6 4
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd.	29—30	−1	5 10 0
100,000	10	June 10	7	Cape Town & Dis., Ltd.	15—16	..	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stk.	Apl 15	13½	Commercial Old Stock	315—325	..	4 3 1
200,750	„	„	10½	Do. New do.	252—257	..	4 1 8
200,750	„	June 10	4½	Do. 4½ p. c. Db. dc.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207—212	..	5 13 2
200,000	„	„	9	Do. 7 p. c. Prf.	197—202	..	4 9 1
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	310—315	..	4 8 11
168,400	„	„	11	Do. B 7 p. c.	255—265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125—130*	..	4 0 9
60,000	„	„	5	Do. 5 p. c. Prf.	140—145*	..	3 9 0
486,090	10	July 28	11	European, Ltd.	23—24	..	4 11 8
354,060	10	„	11	Do. £7 10s. paid	16½—17½	..	4 14 4
5,922,230	Stk.	Aug. 12	12¼	Gaslight & Coke, A, Ord	291—296*	+3	4 2 9
100,000	„	„	4	Do. B, 4 p. c. max.	120—125*	..	3 4 0
665,000	„	„	10	Do. C, D, E, 10 p. c. Prf.	305—310*	..	3 4 6
30,000	„	„	5	Do. F, 5 p. c. Prf.	152—157*	..	3 3 8
60,000	„	„	7½	Do. G, 7½ p. c. do.	230—240*	..	3 2 6
1,300,000	„	„	7	Do. H, 7 p. c. max.	193—198*	+1	3 10 8
463,000	„	„	10	Do. J, 10 p. c. Prf.	305—310*	..	3 4 6
476,000	„	„	6	Do. K, 6 p. c. Prf.	182—187*	..	3 4 2
1,061,150	„	June 10	4	Do. 4 p. c. Db. Stk.	131—133	..	3 0 2
294,850	„	„	4½	Do. 4½ p. c. do.	148—153	..	2 18 10
958,000	„	„	6	Do. 6 p. c. do.	198—203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4
8,800,000	Stk.	„	10	Imperial Continental	210—215	..	4 13 0
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk.	101—104*	..	3 7 4
560,000	100	Apl. 1	5	Met. of Melbourne { 5 p. c. Db. / 4½ p. c. Db.	111—113 / 107—109	+1 / ..	4 8 10 / 4 2 7
250,000	100	„	4½				
75,000	5	June 29	6	Malta & Medn., Ltd.	4¾—5¼	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd.	14—15	..	6 13 4
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	235—240	..	4 1 3
252,355	Stk.	Jan. 8	3½	Do. 3½ p. c. Db. Stk.	113—117	..	2 19 10
150,000	5	May 26	8	Oriental, Ltd.	7—7½	..	5 6 8
135,000	5	„	8	Do. New, £4 10s. pd.	6—6½	..	5 10 9
15,000	5	„	8	Do. do. 1879, £1 pd.	1—1½	..	5 6 8
60,000	5	Mar. 11	7	Ottoman, Ltd.	5—5½	..	6 6 2
500,000	100	June 1	6	People's Gas { 2nd M. of Chicago { Bd.	103—108	..	5 11 1
848,070	10	May 26	6	River Plate Ord.	9—9½	..	6 6 4
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	97—99	..	4 0 10
250,000	10	Apl. 29	10	San Paulo, Ltd.	15—16	..	6 5 0
135,000	Stk.	Mar. 30	10	Sheffield A.	245—248	..	4 0 8
209,053	„	„	10	Do. B.	245—248	..	4 0 8
447,427	„	„	10	Do. C.	245—248	..	4 0 8
5,600,000	Stk.	Aug. 12	5½	South Metrop., 4 p.c Ord.	140—143*	−1	3 14 7
1,460,000	„	July 14	3	Do. 3 p. c. Db. Stk.	101—104	..	2 17 8
60,000	Stk.	Mar. 11	12	Tottenham and { A. / Edmonton { B.	285—295 / 205—215	.. / ..	4 1 4 / 4 3 9
60,000	„	„	9				
182,380	10	June 10	7	Tuscan, Ltd.	11¼—12¼	−1	5 12 0
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313—318	..	3 6 0
150,000	„	„	5	Do. 5 p. c. Prf.	170—175	..	2 17 2
160,000	„	„	4½	Do. 4½ p. c. Pf. Stk., 1875	148—152	..	2 19 3
175,785	„	Mar. 30	4½	Do. 4½ p. c. Db. Stk.	157—162	..	2 15 7
1,720,560	Stk.	Apl. 15	8	East London, Ord.	225—230	..	3 9 7
654,740	„	June 29	4½	Do. 4½ p. c. Db. Stk.	157—160	..	2 16 3
390,000	„	„	3	Do. 3 p. c. Db. Stk.	103—105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115—118	..	3 3 7
310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	142—147	..	2 14 5
708,000	Stk.	Aug. 12	14	Kent	364—369*	..	3 15 11
160,000	„	„	7	Do. New, 7 p. c. max.	212—217*	+2	3 4 6
1,043,800	100	June 29	10	Lambeth, 10 p. c. max.	298—303	..	3 6 0
406,200	100	„	7½	Do. 7½ p. c. max.	227—232	..	3 4 8
350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
500,000	100	Aug. 12	13¼	New River, New Shares	425—430*	..	3 1 8
1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	166—171	..	3 10 2
126,500	100	„	6	Do. do. 7½ p. c. max.	157—162	..	3 14 1
489,200	Stk.	„	5	Do. do. 5 p. c. Prf.	168—172	..	2 18 2
1,019,585	„	Apl. 15	4	Do. 4 p. c. A Db. Stk.	141—144	..	2 15 7
1,155,066	Stk.	June 10	10	West Middlesex	300—305	+3	3 5 7
200,000	„	„	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
200,000	„	Mar. 11	3	Do. 3 p. c. Db. Stk.	104—106	..	2 16 7

* Ex div.

In pursuance of their policy of making things disagreeable for their Manager, the Forfar Gas Corporation held a meeting on Monday to consider the estimates for the current year which had been prepared by Mr. Waddell. These showed a total estimated expenditure of £5670; the estimate for the working and collecting department being £3922, and for funds, interest, annuities, &c., £1748. The gas-rate, at 3s. 9d. per 1000 cubic feet (less discount) was estimated to produce £5060; and residual products, £600—showing an estimated deficit of £10. A footnote states that, by the adoption of sulphate of ammonia plant, there would be an increased revenue from residuals of £130. The rate for gas last year was 3s. 9d. Bailie Patullo, Convener of the Gas Committee, moved the adoption of the estimates. They were providing in the accounts, he said, £270 for the sinking fund; £145 for the contingent fund; £90 for arrears to be written off; and £90 as the deficit upon the past year. The arrears for residual products were proposed to be paid off in two or three years. Mr. Esplin seconded. Mr. Christie said he found the estimate for coal was £70 less than last year; retorts, £14 less; furnishings and repairs, £296 less; and wages, £95 less. The reduction in the wages astonished him, seeing that they expected to make £91 worth more gas than they actually made last year. Bailie Patullo said that a great deal of the additional wages last year was eaten up in extras which would not occur this year. Mr. Christie attacked the system of financing, which, to tell the truth, has not so far been of the most approved description, as was admitted by Provost M'Dougall. Had Mr. Christie confined himself to an attack on the financial policy, there would have been no reason for calling his conduct in question; but he asserted that the making up of the accounts in a manner not to be commended was a work for which Mr. Waddell was personally blameworthy. It was in vain Mr. Waddell protested he had nothing to do with the making up of the accounts, which is the work of the Auditor; Mr. Christie was not to be turned aside in his demand for the appointment of a couple of qualified accountants "to make a full and complete investigation into the affairs of the gas-works." Mr. Waddell said that, for his part, he courted a full investigation into his books; and it was then resolved to appoint two accountants to make the inquiry suggested. How does this zeal on Mr. Christie's part, for purity of finance, appear when looked at in the light of Mr. Waddell's remark that his books at the gas-works were open to any member of the Corporation who chose to inspect them, but that Mr. Christie, who had made the attack, never glanced at them? This is not enlightened administration of a public department. Mr. Christie poses as an economist; but I venture to say that his agitations have an effect in the opposite direction. Where confusion is, there is always waste.

The Johnstone Gas Commissioners have, in consequence of the growth in the consumption of gas, resolved upon the telescoping of one of the three holders at the works, increasing its capacity by 120,000 cubic feet. The cost is to be about £1200. The make of gas last year was 32½ million cubic feet; and if the increase this year be in the same ratio, it will amount to about 36 million cubic feet.

The Huntly Gaslight Company, which is described as the oldest local joint-stock company, is reported to be in a very healthy and flourishing condition. A dividend at the rate of 6½ per cent. has been declared for the past year; and the price of gas has been reduced by 5d. per 1000 cubic feet—the price for lighting being now 6s. 8d. per 1000 cubic feet, and for cooking and heating 5s. Oil gas is used.

The Portsoy (Banffshire) Police Commissioners, who recently acquired the undertaking of the local Gas Company, have resolved to borrow a sum not exceeding £1400, upon the security of the rates, at 4 per cent. interest, for the repair and renewal of the gas-works plant.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 20.

Sulphate of Ammonia.—The activity referred to in last week's report has continued throughout this week, and a further substantial advance has been established; the closing quotations being £10 to £10 2s. 6d. per ton delivered f.o.b. at the ports. A fair amount of buying has been done by consumers; but advanced prices are somewhat checking further business. In the forward position, too, makers have advanced their ideas, and £10 per ton is now generally required, delivered f.o.b. at the ports, October-March delivery.

Nitrate of Soda is somewhat firmer; and 7s. 9d. per cwt. is the closing quotation for fine quality.

LONDON, *Aug.* 20.

Tar Products.—Pitch is quotable slightly dearer; but it is doubtful whether any real business has been transacted at the higher prices. The demand for creosote continues; and picklers of timber are doing a larger trade this season than ever before. There is no change in the value of anthracene; but little outside lots are being hawked all over the market, seriously damaging the position. Disinfecting carbolic acid is moving off freely, as is natural at this time of year; while 60's carbolic maintains its value, there being little offering. Some high competitive prices have recently been paid for tar in the Lancashire district, which are certain to leave the buyer a loss unless products improve in value. Average values obtaining during the week are: Tar, 12s. to 16s. Pitch, east coast, 24s.; west coast, 20s. Benzols, 90's and 50's, nominal, 9½d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1½d. Crude, 30 per cent., naphtha, 4¼d. Creosote, 2½d. Heavy oils, 42s. 6d. Carbolic acid, 60's, 2s. Naphthalene, pressed, 55s.; drained salts, 30s. Anthracene, nominal, "A" 4d.; "B" 3d.

Sulphate of Ammonia has made a rapid advance in price during the past week, and is to-day quoted at all ports at about £10 to £10 2s. 6d., less 3½ per cent. There is an undoubted scarcity of sulphate, and those who have sold without covering themselves are finding much difficulty in implementing contracts.

Another Acetylene Gas Company.—A Company has lately been formed in Paris, with a capital of £80,000, to undertake lighting by acetylene gas. The title is La Compagnie Urbain d'Eclairage par le Gaz Acetylène.

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COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The tendency generally throughout the coal trade is in the direction of the hardening up in prices as the autumn approaches. The better qualities are necessarily still only in limited request for house-fire purposes; but as surplus supplies are to a large extent going away for shipment, collieries have not accumulated any heavy stocks. The principal firms have under contemplation an official advance in their list rates on Sept. 1. The position with regard to all other descriptions of fuel continues exceedingly strong. Common round coals are in active inland request; and engine classes of fuel also move away readily, only some of the inferior sorts here and there hanging upon the market. Prices, both for steam and forge coals and engine fuel, stiffen up steadily. At the pit mouth, the better qualities of Wigan Arley are firm at 10s. to 10s. 6d. per ton; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; with common round coals not averaging anything under 7s. to 7s. 6d. Slack ranges from 3s. 6d. to 3s. 9d. per ton for the commoner sorts, to 4s. 6d. and 5s. for better qualities. In the shipping trade, there is a brisk inquiry for steam coals, and also for house-fire qualities, with a further upward move in prices. Delivered at the ports on the Mersey, ordinary steam coals are quoted from 9s. 6d. to 10s. per ton; while better qualities are quoted in some cases at 10s. 3d. to 10s. 6d. Good qualities of steam coals, delivered at the Partington tips of the Manchester Ship Canal, have been quoted about 11s. per ton.

Northern Coal Trade.—There has been a steady trade, with full prices, for nearly all classes of coal; and there has been also an increased delivery for several of the great consumers, so that the pits have been full of work, and the output has seemed larger than a few weeks ago. Best Northumbrian steam coals vary in price from 14s. to 15s. per ton f.o.b.; second class steam is 13s. to 13s. 6d.; and steam smalls are 7s. to 7s. 6d. In manufacturing coals, the demand is good on old contracts, and the delivery is heavy; but prices show no change of moment this week. In the gas coal trade, there is an increasing consumption; and for occasional cargoes the price is higher—up to 10s. 6d. per ton f.o.b. being asked for best Durham kinds, while some of the local contracts have been recently fixed at about the equivalent of 9s. 3d. per ton f.o.b. Of course, there are large contracts being delivered at less than 6s. per ton; but some of these will end in a few weeks, and they will be followed by others at better prices. Prices of gas coke are not generally altered; but the tendency is upwards for coke for manufacturing purposes.

Scotch Coal Trade.—The coal trade in Scotland continues to display unwonted activity. Good prices are also to be had, but not so high as the volume of trade would warrant were it not that the trade is largely of a temporary nature, only going to Scotland because of the lack of supplies from South Wales. The Admiralty have placed some orders for Scotch coal, as an experiment; and everything is being done by coalowners to select supplies which will come as near to the Welsh article as possible. The men have made a demand for an advance in wages of 6d. per day. The demand has been conceded in the West of Scotland. In Fifeshire the masters, while stoutly maintaining that the realized prices have not warranted the wages paid, have expressed their willingness to meet in conference with the representatives of the miners on the subject. The Lothian coalowners have not replied to the men's demands, and, as a consequence, their leaders have advised them to hold meetings to consider the action to be taken by them. The prices quoted are: Main, 9s. 9d. to 10s. per ton f.o.b. Glasgow; ell, 10s. 6d. to 11s.; and splint, 9s. 9d. to 10s. The shipments for the week amounted to 221,797 tons—a decrease, when compared with the previous week, of 28,971 tons, but an increase, when compared with the corresponding week of last year, of 17,564 tons. For the year to date, the total shipments have been 5,956,572 tons—an increase upon the corresponding period of last year of 1,080,112 tons.

Sales of Shares.—Messrs. Griffiths and Cherwell on Monday last disposed of £800 of original consolidated stock in the Newmarket Gas Company, Limited. It was offered in £100 lots, and realized an average of £164 each. Mr. J. Tower recently sold at Sheerness two £10 shares in the Sheppy Gas Company for £23 10s. each, and one similar share for £23 15s., after a keen competition. At a sale of stock of the Dudley Gas Company last week, the very high price of £172 per £100 of stock was reached. Messrs. J. Reeves and Son sold at Margate last week several lots of the Margate Gas Company's stock, on which a dividend of 11 per cent. is being paid, at prices ranging from £72 to £76 per £50 lot.

Carlisle Corporation Gas and Water Profits.—The audit of the gas and water accounts of the Carlisle Corporation was completed last Wednesday. The gross profits from the manufacture and sale of gas amounted in the past financial year to just a little over £9000, and those from water to rather more than £6000; making about £15,000 from the two concerns. Compared with the previous year, the gas profits show a decrease of £875; but coal cost £1000 more. As some compensation for the falling off in the gas profits, those for water show an advance of £350, owing to increased rental. The net amount to be handed over in relief of the rates will be larger than last year, owing to the falling in of the gas loan of 1887, in respect of which £1225 was charged against the account. The net amounts which went in relief of the rates last year were £5757 on the gas account, and £3069 on the water account.

Winding Up the Driffield Gas Company.—It will doubtless be remembered that the undertaking of the Driffield Gas Company was acquired last year by the District Council, who took possession on July 1, 1897. Since then the affairs of the Company have been in the hands of the Liquidator (Mr. G. B. Tonge), who called a meeting of shareholders for Monday last week, and laid before them the accounts showing how the property had been disposed of and the winding up conducted. Each holder of a fully-paid £10 share had received £19 3s. 11d.; and for each £6 10s. share, £15 13s. 11d. was paid. Out of the final income account 7s. 10·8d. per share had been paid on the £10 shares, and 5s. 1·62d. on the £6 10s. paid shares. The accounts were adopted; and a vote of thanks was passed to Mr. Tonge for his services—he not having made any charges. The result of the winding up was considered satisfactory, although shares have during late years exchanged hands at £20 each.

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Acetylene Gas Lighting.—The Catholic Cathedral at Kilkenny is to be lighted by acetylene gas by the Sunlight Gas Company, with Goodwin's apparatus.

Projected Extension of the Evesham Gas-Works.—Mr. Percy H. Fletcher, the Manager of the Evesham Gas-Works, has just presented to the Town Council an exhaustive report on the condition of the gas-works, and of the extensions that will be necessary in the near future if the consumption of gas in Evesham continues to increase at the present rate. To carry out the whole of the improvements he suggests, the estimated cost is £2270.

The Skipton District Council and the Gas-Works.—The Skipton District Council last Thursday received a report giving the conclusions of the Sub-Committee's negotiations for the purchase of the Skipton Gas Company's undertaking. It appeared that the Committee had called in Mr. J. Waugh, of Bradford, to advise them generally as to the condition of the plant. His report was appended; but its contents were not divulged. The price offered by the Committee for the works was £30,000; but this was refused, and the Directors intimated that the Company were unwilling sellers of their undertaking. The matter is to be further considered.

Canadian Natural Gas.—The Canadian Government have decided not to prohibit the exportation of natural gas, but, on the other hand, will permit new pipes to be laid from Sandwich to Detroit (Mich.), under regulations as to the output and the price to be charged to local consumers. For the three years beginning Aug. 1, not more than 3000 million cubic feet are to be exported per annum; this amount to be taken in equal quantities from the Standard and Ontario Companies. Gas is to be supplied at any point along the lines in Canada for any purposes, and at rates at least 10 per cent. lower than are charged outside of Canada; and any corporation or individual is to be entitled to purchase gas at any well at 5 c. per 1000 cubic feet. The use of artificial means for increasing the pressure is strictly forbidden.

The Gas Supply of Coleraine.—The Coleraine Town Commissioners, at their meeting last Tuesday, discussed a motion proposed by Mr. Bamford, that the price of gas be reduced from 3s. 9d. to 3s. 6d. per 1000 cubic feet, and that the charge for public lighting be abolished. Mr. Bamford explained that he had, after consideration, omitted two of the items originally contained in his notice—viz., to abolish meter-rents and to reduce the town-rate; and the amount involved in the proposals which he now made would only be £430 per annum. He congratulated the town on the fact that already they were supplying gas at a cheaper rate than any town of the size in Ireland. The Town Clerk said that £350 was the maximum length they could go and leave the place solvent. Mr. Bamford, however, thought the balance would be found to come from the increased consumption of gas caused by the reduction. Mr. Gribbon expressed the opinion that the gas consumers were already getting full value for their money; and he suggested that a better plan would be to form a sinking-fund for the reduction of the Board's debt. After some further remarks by members, Mr. Bamford intimated his acceptance of the Town Clerk's suggestion; and the Commissioners thereupon unanimously agreed to the reduction in the price of gas, and also the charge for public lighting.

Colney Hatch Gas Company.—At the half-yearly general meeting of this Company next Thursday, the Directors will report a continued increase in the consumption of gas, and also an improvement in the revenue from the sale of residuals. The sale of 28,449,900 cubic feet of gas to private consumers and 2,299,000 cubic feet for public lighting and under contracts, in the six months ending June 30, produced £5893; and the total receipts were £7418. The expenditure being £5408, there was a balance of £2010 to go to the profit and loss account. The sum available for distribution is £3901; and the Directors recommend dividends at the rates of 10, 7, and 5 per cent. per annum on the three classes of capital. This will leave a balance of £2197 to be carried forward.

Prepayment Meters and Free Fittings at Exeter.—The Exeter Gas Company have decided to adopt prepayment meters, and to fit up houses free of charge. The fittings are to comprise service-pipe, meter-tap, two brackets, one pendant, three 4-feet governor burners, three comet globe-holders, the necessary composition pipe, hooks, blocks, &c., and a "Cheltenham" cooking-stove. Where houses are fitted up free, gas will be supplied at the rate of 20 cubic feet for 1d.; but consumers providing their own stove and internal fittings will have 23 cubic feet—the meter being in this case also fixed free of cost. Free fittings are not to be supplied to any house let at a less rental than £14 per annum. This condition has been criticized in the local papers, where it is stated that few among the artizan classes of Exeter live in £14 houses unless they sublet or take in lodgers; and the condition will therefore exclude many respectable householders who would become consumers of gas if they were not debarred.

"Engineering" on the Workman Director Question.—"Perhaps the greatest triumph yet achieved in the labour world," says "Engineering," "has been accomplished by Mr. George Livesey, the enterprising Managing-Director of the South Metropolitan Gas Company. In consequence of the great strike at the Company's works a few years ago, Mr. Livesey instituted a system of profit-sharing; intimating at the time, or very shortly afterwards, that he hoped the men would acquire sufficient joint capital to enable one or two of the workmen to be elected on the Board. The idea at the time seemed too vast and far distant to be seriously discussed; but it is now an accomplished fact. The mere fact of the election of two labour representatives on the Board speaks well for the success of the profit-sharing scheme. It cannot be supposed that all Mr. Livesey's co-Directors were equally enthusiastic for such a result; it would not be natural that they should be. They had to be convinced; and the conviction has been so complete that the election of two labour representatives seems to have been unanimous. This is the largest concern in which the principle has been tried; its success will tempt other captains of industries to do likewise. In this way some of the difficulties of labour may be overcome. It is a purely voluntary submission on the part of capital and labour to the principle of mutual co-operation for mutual advantage—each receiving a fair share of the results of such combined action. If it be found that capital gets a better, safer, and more permanent return in the shape of interest or profit, and yet that labour not only gets fair wages but a bonus on its earnings, we may be sure that such a system will grow, and expand in various directions."

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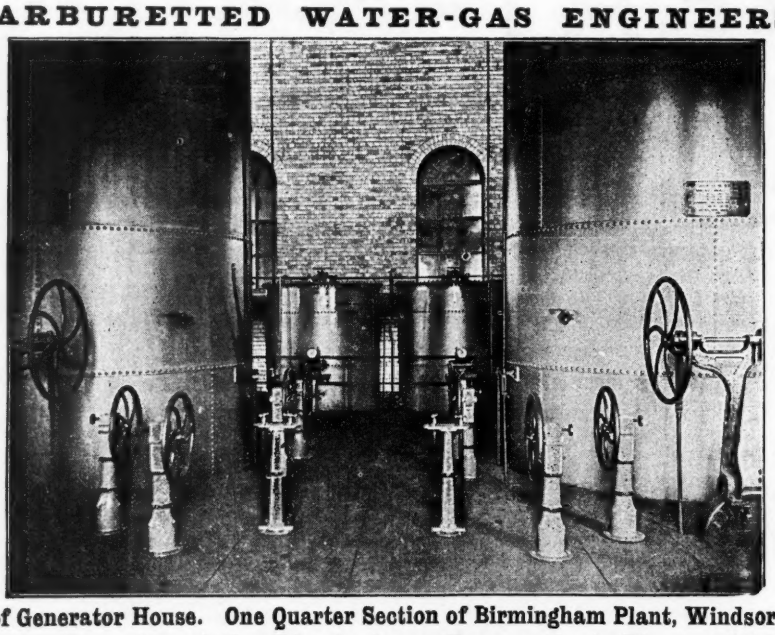

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Downham Market in Darkness.—In consequence of a dispute between the Downham District Council and the Gas Company, the town is at present in darkness. The Company ask 42s. per annum per street lamp; the lamps not to be lighted for five nights at each full moon. The Council are willing to pay the price; but they object to the off nights.

Fire-Bricks in Warsaw.—According to a Foreign Office paper lately issued, there is a scarcity of fire-bricks in the Warsaw district, although refractory clay is to be found in abundance. As yet there is in Poland only one factory for their manufacture, the output of which cannot meet the demand on account of the growth of metallurgical and chemical industries. Nearly all the fire-bricks used come from Germany. It is believed that there would be a good opening for an English firm in this line, as English are deemed superior to German bricks. Those on the market are sold at a high price; and to compete with the German article the price would have to be lower.

The Gas Supply of Frodingham.—It may be remembered that early in the last session of Parliament a Bill for the incorporation of a Gas Company for the Frodingham District was before a Select Committee, but was withdrawn in consequence of the serious opposition offered to its progress. As a result, the Brumby and Frodingham Urban District Council, at their meeting last Tuesday, considered a scheme for putting down gas-works of their own at a cost of about £3400. They decided to give the statutory notices of application for the necessary powers; and at the same time to open up negotiations with the Scunthorpe Council to provide them with a temporary supply of gas. It seems from what transpired at the meeting that the costs of the Brumby and Frodingham Council's opposition to the Frodingham Gas Bill of last session have been taxed at £582 3s., which does not include the £100 paid to the Scunthorpe Council as part of the promoter's expenses. The Scunthorpe Council's expenses were £841 1s. 3d.

Incandescent Gas v. Electric Light at Newbury.—The Newbury Corporation are the owners of the gas-works, the profits from which furnish a substantial sum in relief of the rates. Some eight years ago, they obtained a Provisional Order giving them the sole authority to supply electric light in the borough. No one, however, has applied for the light, and consequently no steps have been taken. Notice has now been given by two electric light companies to apply for Orders; and the Secretary of another has offered to purchase the Corporation's rights under their Order, on their allowing his company to take over the lighting of the borough. The Corporation, however, have declined to part with their powers; moreover, they have instructed the Town Clerk to oppose all applications for Orders. They are experimenting with Welsbach gas-burners, with the intention of bringing the street lighting up to date; and it is expected that the price of gas will be still further reduced from the 4s. 2d. per 1000 cubic feet at which it now stands (3s. 11d. for cash).

St. Helens Corporation Gas and Water Supply.—The annual accounts of the St. Helens Corporation, issued last week by the Borough Treasurer (Mr. J. Brown), show the sound financial position of the Corporation notwithstanding the fact that the town is said to be one of the lowest rated county boroughs in the kingdom. The total funds on the gas-works account have increased during the past year by £3502, and now stand at £55,416. The water-works fund account shows an increase of £1828, and stands at £94,752. Out of the gas-works fund, £39,030 has been handed over to the borough fund, and £25,370 has been applied to the gas-works general expenditure. The total expenditure on the new electric lighting plant has been £13,559. The amount authorized to be borrowed by the Corporation is: On the gas-works account, £205,949; actually borrowed, £205,884, of which £24,792 has been repaid. On the electricity works, £26,500; borrowed, £10,000. Water-works account, £230,076; borrowed, £201,295; repaid, £75,452. The net debt of the Corporation is £471,703; while the rateable value of the borough on the highway rate is £328,463, and on the borough rate, £310,976.

Water Supply in the Isle of Wight.—The Corporation of Newport (I.W.) are promoting a scheme for obtaining a good supply of water; but it will be two miles farther distant than was expected, and the cost is estimated to exceed £20,000. Mr. H. P. Boulnois, M.Inst.C.E., one of the Local Government Board Inspectors, held an inquiry last Thursday, at the Newport Guildhall, relative to an application by the Corporation for leave to borrow a further sum of £8300 for the object. Mr. F. Shields, the Assistant Town Clerk, explained that a loan of £12,000 had already been sanctioned; and Mr. Baldwin Latham stated that the increased cost was due to the Local Government Board insisting on the source of supply being two miles farther out than was originally intended. Owing to the nature of the strata, many difficulties had to be overcome; and instead of the contract being completed within nine months, it had extended over two years, though the Contractor had pushed on the work as fast as he could. The supply, however, was far in excess of that anticipated; the yield being about 750,000 gallons per day, which could be increased to 1,500,000 gallons if the four reflex valves which had been put in were used. The Inspector subsequently viewed the works.

The Oldham Explosion.—At last Wednesday's meeting of the Gas-Works and Electric Lighting Committees, Mr. Andrew, the Gas and Water Superintendent, presented his report with regard to the recent explosion (*ante*, p. 390). He stated that about ten o'clock on the night of the 11th inst., an explosion of gas occurred in Bottom-o'-th'-Moor, by which the electric light culvert for a distance of 54 yards was damaged, and the footpath disturbed. The cause was a leak in the gas-main; the gas getting into the culvert. It was ignited by a spark from the switch in a lamp-post when the light was being extinguished. The work of repair was commenced shortly afterwards, and was so far completed the following day as to allow current to be again supplied in the immediate vicinity and the district beyond. The man who was turning out the light, and a girl who happened to be on the footpath at the time, were thrown down, and the latter sustained slight injury—principally from shock. No damage was caused to the adjoining property. In the course of the discussion, Mr. Andrews said he had arranged with Mr. Newington, the Electrical Engineer, to make periodical inspections of the culverts. The leakage of gas was 120 yards away from the point of the explosion, and where the ignition took place. It was decided to leave the matter over for further consideration; the culverts to be examined periodically in the meantime.

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EIGHTEEN OTHER VARIETIES.

The Price of American Pipes.—The Glasgow Water Committee last week considered the new offers they had received for 1000 tons of cast-iron pipes. A Philadelphian firm were again the lowest; but this time the difference between their quotation and that by a local firm was only some £60 or £70. When the offers were opened on the first occasion there was a difference of between £600 and £700; but the British firms gave lower figures this time. The Committee deferred consideration of the offers till next meeting. The feeling, however, was expressed that it would be unfair to use the American tenders to bring down the prices of the home pipes, and then throw over the Yankees without an order.

Mr. F. S. Cripps intimates that he has opened a City office at No. 71, King William Street, E.C.

The business of Messrs. Henry Greene and Sons, gas and electrical engineers, of Cannon Street and Farringdon Road, E.C., has just been converted into a limited liability company, with a capital of £27,000, in £5 shares.

Messrs. Richmond and Co., Limited, have had reprinted the press notices of their profit-sharing distribution at Warrington on the 6th of May. Upon the front page are reproductions of photographs of three incidents of the event.

The interest of the late Mr. Samuel Edward Parker in the firm of Messrs. Parker and Lester, of Ormside Street, Old Kent Road, has been acquired by Mr. Frederick Hunt Lester, the surviving member of the firm; and the business will in future be carried on by him on the same premises and under the same name.

The "Simplex" Ascension-Pipe Company, Limited, is the name of a privately-formed Company who have taken over the entire rights of the patent and business formerly carried on by Messrs. Meek, Davison, and Southam, of Manchester. An illustrated description of the invention referred to was given in the "JOURNAL" for July 6, 1897, p. 40.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

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LONDON, E.C.

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JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
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Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Aug. 2, p. 278.]

TUBES for Gas, Steam, and Water (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
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HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 350, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO., VICTORIA PAINT WORKS, MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

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BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

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OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
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AT to-day's Price of Benzol, Illuminating POWER cost less than a HALFPENNY PER CANDLE.
Apply to SADLER AND CO., MIDDLESBROUGH.

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
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PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE. Information and Handbook on application.
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FOR FULL PARTICULARS, APPLY TO THE MAKERS:
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Telegrams: "GWYNNEGRAM, LONDON."
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Telephone No. 95 Holborn.
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PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
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To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
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THOROUGHLY qualified and experienced ENGINEER and MANAGER desires similar appointment, with or without Secretarial duties. Highest references. Satisfactory reasons for changing.
Address No. 3114, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER wants a Situation in a Gas-Works, either as MANAGER or ASSISTANT. Is well up in Gas Manufacture. Four Years in a Gas-Works; and Three Years with Manufacturing Gas Engineers, Drawing Office, &c. Age 23.
Apply, by letter, to No. 3119, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ART Metal, Gas, and Electric Fittings. Gentleman, practical, experienced, good connection London, Midlands, and North, open for ENGAGEMENT (with agreement), either as TRAVELLER, MANAGER OF WORKS, or to TAKE CHARGE of SHOW-ROOMS. Good Designer. Aged 36. First-class references.
Apply, A.M., 775, Deacon's, 154, LEADENHALL STREET, E.C.

WANTED, in a large Works, a competent person as CASHIER. Also an experienced LEDGER and BOOK KEEPER.
Applications, with not exceeding Three Testimonials, to be sent to No. 3118, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A GENTLEMAN of wide experience, calling upon all Gas Companies in the North-West and North-East of England, also upon Plumbers' Merchants, is open to accept another COMMISSION.
Address No. 3116, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Manager, single-handed, to manage Works making 4 Millions. Help given when required. House, Coal, and Gas free.
Apply, stating Wages, to J. A. UTTING, Secretary, Kegworth Gas Light and Coke Company, Limited, Kegworth, near DERBY.

WANTED, by a long-established Firm a thoroughly competent REPRESENTATIVE, to extend connection among Gas Engineers in London and District.
Apply, by letter, in confidence, stating Qualifications and Salary required, to No. 3117, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS STOKERS.

WANTED, a strong, steady, and respectable married Man, not over 30, as STOKER. Must be a good Shovel Charger, used to Engine and Exhauster, and who will make himself generally useful. Wages 28s. per week. None but those who have had similar experience need apply.
Apply, with References, stating Age and previous Experience, to the MANAGER, Gas-Works, Arundel, SUSSEX.

UCKFIELD GAS COMPANY.

WORKING Manager wanted immediately, for small Works in the Country. Make about 6 Millions. Particulars of duties will be furnished.
Applications, with *copies* of three Testimonials, and stating Wages required, to be sent to me by the 5th of September next.

GEO. EARL,
Secretary.

Uckfield, Sussex,
Aug. 18, 1898.

HIGH WYCOMBE GASLIGHT AND COKE COMPANY, LIMITED.

THE Directors of the above-named Company invite applications for the post of COLLECTOR and OFFICE ASSISTANT. Salary £80 per annum.
The person appointed will be required to devote his whole time to the various duties, to furnish evidence of capabilities and integrity, and give usual security.
Applications, stating age and experience, with *copies* of three Testimonials, to be sent to the undersigned by Twelve o'clock noon on Aug. 30.

By order of the Board,
J. FRED. WICKS, C.E.,
Manager and Secretary.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two 6 feet square by 3 ft. 6 in. PURIFIERS, second-hand or new, with 6-inch Connections (in bottom plates), and with Bars, Grids, and Covers Complete; also a 6-inch CENTRE-VALVE to work four Purifiers on, or one off. Delivered on North Wales Coast.
Apply to W. BELTON, Gas-Works, SHREWSBURY.

GASHOLDER, 35 feet diameter by 14 feet deep, with five strong Cast Columns, Wrought Lattice Girders, and Counterbalance. Erected 1892. Cheap, if sold immediately.
J. F. BLAKELEY, Ravensthorpe, near DEWSBURY.

FOR SALE—Station Meter (Milne's). Passes about 4000 Cubic Feet per hour. Bye-Pass Connections, with Three 6-inch Slide-Valves and Cradle-Stand complete. Seen working. Also One 7-inch STATION GOVERNOR (Laidlaw's), without Bye-Pass.
Apply to the GRANGEMOUTH GAS COMPANY, LIMITED, GRANGEMOUTH, N.B.

FOR SALE—One 8-inch Crossley STATION GOVERNOR, and One 6-inch Parkinson STATION GOVERNOR, with all Valves and Connections.
Further Particulars from ARTHUR GRAHAM, Gas and Water Manager, MANSFIELD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

CITY OF BELFAST.
(GAS DEPARTMENT.)

TENDERS are invited for the supply of CONSUMERS' METERS for the period ending June 30, 1899.
Meters are to be delivered to our Stores in good order, and carriage paid.
Particulars may be obtained on application at the Gas-Works; and Tenders, endorsed "Tender for Meters," must be delivered in my Office not later than Wednesday, Sept. 7, 1898.
The lowest or any Tender not necessarily accepted.

SAMUEL BLACK,
Town Clerk.

CITY OF BELFAST.
(GAS DEPARTMENT.)

TENDERS are invited for the supply of 370 Lengths of CAST-IRON PIPES of 12 inches diameter, delivered free of all charges on Belfast Quay.
Particulars and Specification may be had on application at the Gas-Works.
Tenders, endorsed "Tender for Pipes," must be delivered at my Office not later than the 31st of August, 1898.
The lowest or any Tender not necessarily accepted.

SAMUEL BLACK,
Town Clerk.

BOROUGH OF WIDNES.

THE Corporation invite Tenders for the purchase of about 1000 Tons of GAS TAR from their Gas-Works, for the Twelve Months ending Sept. 30, 1899.
Forms of Tender and Conditions of Contract may be obtained from Mr. Isaac Carr, Assoc.M.Inst.C.E., Gas-Works, Widnes.
Tenders, endorsed "Tar," to be delivered to the undersigned not later than the 5th prox.
The highest or any Tender not necessarily accepted.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
Aug. 17, 1898.

ABERAVON CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee of the above Corporation invite TENDERS for the supply of about 270 Tons of good CANNEL (delivered at Port Talbot Railway Station) for a period of Twelve Months from the 1st day of September next, in such quantities as directed by the Manager, Mr. W. G. Owen.
Tenders, sealed, and endorsed "Cannel," to be sent, not later than Twelve o'clock noon, on Tuesday, Aug. 30, 1898, to the Town Clerk.
The lowest or any Tender not necessarily accepted.

M. TENNANT,
Town Clerk.

Talbot Square, Aberavon,
Aug. 17, 1898.

URBAN DISTRICT OF MILFORD HAVEN.

TENDERS FOR GAS COAL.

THE Milford Haven Urban District Council are prepared to receive TENDERS for about 480 Tons of GAS COAL, including CANNEL, Large and Through, and also about 40 Tons of BITUMINOUS STEAM COAL, to be delivered between the 1st of October, 1898, and the 31st of March, 1899.
The whole of the Coal to be Fresh Hewn, Clean, and free from Impurities.
Further Particulars and Forms of Tender can be obtained on application to the undersigned.
Sealed Tenders, endorsed "Tender for Coal," addressed to the Chairman, Gas and Water Committee, to be sent in not later than the 5th of September next.
The Council do not bind themselves to accept the lowest or any Tender.

By order,
THOMAS H. LEWIS,
Clerk.

Milford Haven,
Aug. 20, 1898.

BOROUGH OF BLACKPOOL.

THE Gas Committee invite Tenders for the erection of a THREE-LIFT HOLDER and GUIDE-FRAMING, 150 feet diameter.
Plans, Specification, &c., can be inspected at the Office of the Engineer as below.
Sealed Tenders to be sent to the Chairman of the Gas Committee, at the Gas Office, by Saturday, Aug. 27.

Signed,
JOHN CHEW,
Engineer and Manager.

Gas Office, Princess Street, Blackpool.

HAWORTH URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive TENDERS for the CONVERSION of an old STONE GASHOLDER TANK into a TAR and LIQUOR TANK, as per Plans and Specifications prepared by the Gas-Works Engineer.
Further Particulars may be obtained on application to the Gas-Works Manager, Gas-Works, Haworth.
Sealed Tenders, marked "Tar Tank," to be delivered to me the undersigned not later than the 2nd of September, 1898.

WM. ROBERTSHAW,
Clerk to the Council.

1, Burlington Chambers, Keighley.

SOUTH SHIELDS GAS COMPANY.

TO COALOWNERS.

THE Directors of the South Shields Gas Company invite TENDERS for the supply of 40,000 Tons of clean, unscreened GAS COAL for delivery into Craft and at the Company's Depôt, South Shields, as required, from September, 1898, to June, 1899, inclusive.
The Directors reserve to themselves the right of taking the Coal in one or more lots.
The lowest or any Tender not necessarily accepted.
Particulars as to Deliveries, &c., may be obtained at the Gas-Works, on application to Mr. W. J. Warner, the Engineer.
Sealed Tenders to be delivered to the undersigned not later than Friday morning, the 26th inst., endorsed "Tender for Coal."

J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, Aug. 12, 1898.

TO CONTRACTORS.

GASHOLDER TANK.

THE Edinburgh and Leith Corporations Gas Commissioners are prepared to receive TENDERS for the EXCAVATORS', CONCRETORS', BRICKLAYERS', and MASONS' WORK in connection with the construction of a BRICK and PUDDLE GASHOLDER TANK, 252 ft. 6 in. diameter by 37 feet deep at their New Works at Granton, near Edinburgh.
Specification and Schedule of Quantities may be obtained on application to the Engineer, Mr. W. R. Herring, on payment of a sum of £5, which will be returned on receipt of a *bonâ-fide* Tender. The Drawings and Sections may be inspected, and any further Information obtained upon application to the Engineer at his Office, New Street, Edinburgh.
Tenders are to be lodged by Ten a.m. on the morning of the 17th day of October, endorsed "Tender for Gasholder Tank," and addressed to the undersigned.
The Commissioners do not bind themselves to accept the lowest or any Tender.

JAMES M'G. JACK,
Clerk to the Gas Commissioners.

25, Waterloo Place, Edinburgh.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the supply of SULPHURIC ACID, made either from native Sicilian Brimstone, recovered Sulphur, or Pyrites. Specific gravity in each case to be stated.
The Price to include free delivery by rail into elevated Tanks, 27 feet high, at the Chemical Works, Aylestone Road.
Probable Quantity about 1700 Tons; to be delivered as required during the ensuing Twelve Months.
Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Acid," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Sept. 10.
The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, Aug. 18, 1898.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE OF THREE AND A HALF PER CENT. DEBENTURE STOCK.

NOTICE is Hereby Given, that the Directors have instructed Mr. ROBERT MACK, Auctioneer, to SELL BY AUCTION, at the Offices of the Company, Grainger Street West, Newcastle-upon-Tyne, on Wednesday, the 31st day of August, 1898, at Twelve o'clock noon precisely, £12,500 of the NEWCASTLE-UPON-TYNE AND GATESHEAD GAS DEBENTURE STOCK (Perpetual), bearing Interest at the rate of 3½ per cent. per annum, payable Half Yearly on the 1st of July and the 1st of January, being part of the moneys authorized to be raised by the Newcastle-upon-Tyne and Gateshead Gas Act, 1896.
For Conditions of Sale and further Particulars, apply to the undersigned.

THOS. WADDOM,
Secretary.

Chief Offices: 33, Grainger Street West,
Newcastle-upon-Tyne, Aug. 5, 1898.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, No. 5, Great Winchester Street, London, on Friday, the 9th of September, 1898, at Two o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended June 30, 1898; to declare Dividends; to elect Auditors; and for other purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 27th of August to the 9th of September, both days inclusive.

By order,
ERNEST L. BURTON,
Secretary.

5, Great Winchester Street,
London, E.C., Aug. 23, 1898.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Offices, Willoughby Lane, Tottenham, on Saturday, the 27th day of August inst., at Twelve o'clock noon precisely, to receive the Report of the Directors, and Statements of Accounts for the Half Year ended the 30th day of June, 1898, to declare a Dividend for the same period, for the Election of Two Directors and an Auditor for the Ensuing Year, and for transacting General Business.

The TRANSFER BOOKS WILL BE CLOSED for CONSOLIDATED STOCKS from the 12th to the 29th of August inst., both days inclusive.

By order of the Directors,
JAMES RANDALL,
Secretary.

Offices of the Company: Willoughby Lane,
Tottenham, Aug. 12, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

Price 6s., Cloth Bound,

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By N. H. HUMPHRYS, Assoc M.Inst.C.E., F.C.S.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

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GENERATORS, BURNERS, & ELECTRIC FURNACES.

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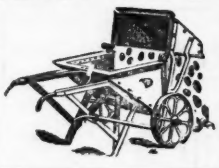

effects a great saving of time, labour, and expense.

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Prices are Reduced.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,
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Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
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W. RICHARDSON, Fitter.

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HYDRATED OXIDE.

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SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
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COKE-BREAKERS,

PRICES REDUCED.
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With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.,
165, QUEEN VICTORIA STREET, E.C.
And at STROUD, GLOUCESTERSHIRE.

NOW READY.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel-Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION OF THE

HANDBOOK
FOR
GAS ENGINEERS and MANAGERS.

By THOMAS NEWBIGGING, M.Inst.C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry. About fifty additional Illustrations are given; and a Steel-Plate Engraving of William Murdoch, the Inventor of Gas Lighting.

— PRINCIPAL CONTENTS. —

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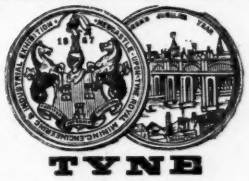

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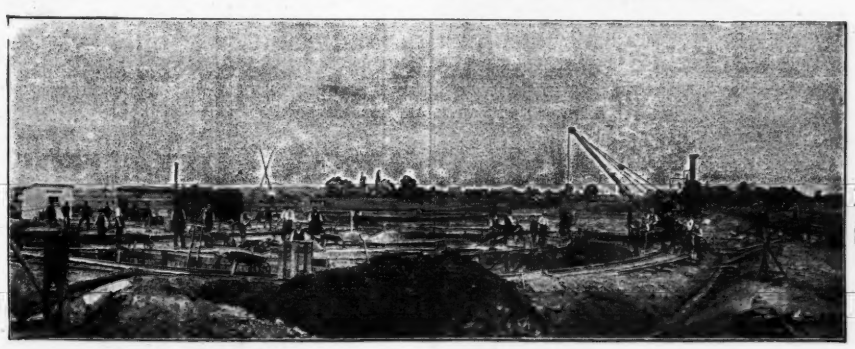

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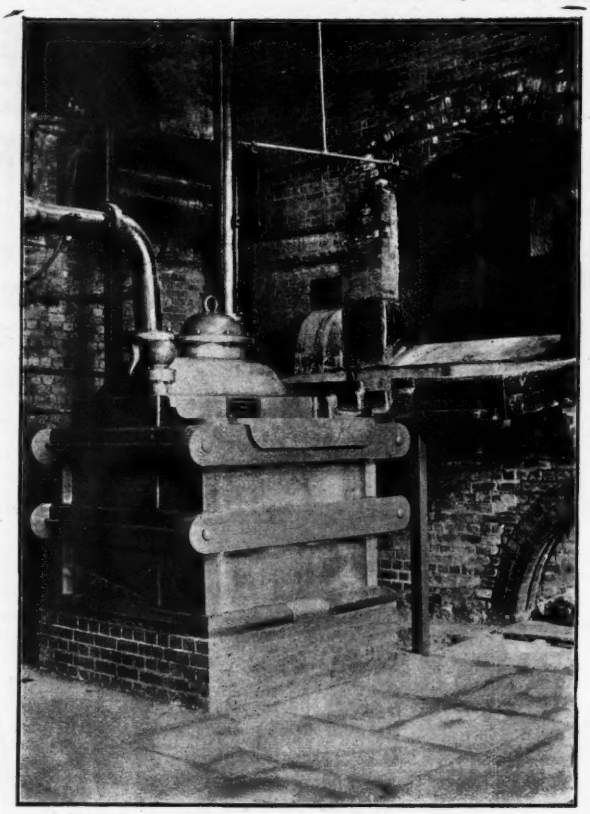

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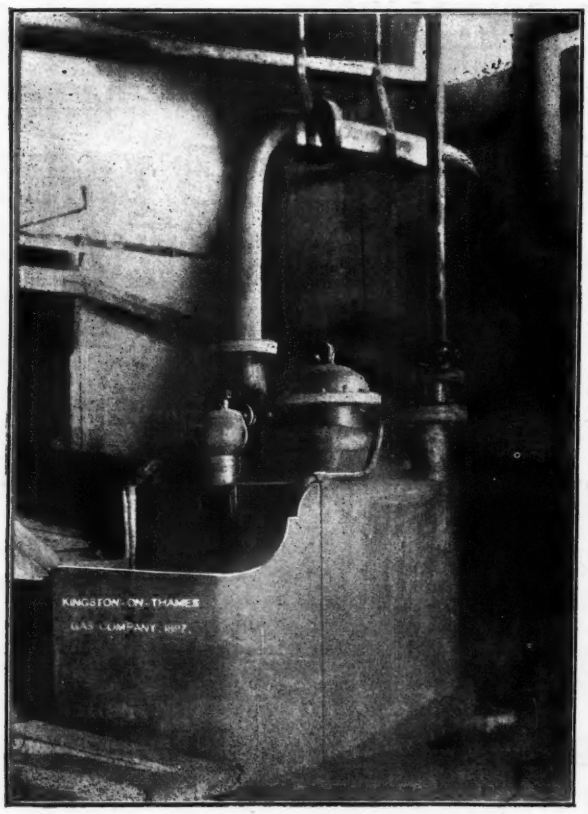

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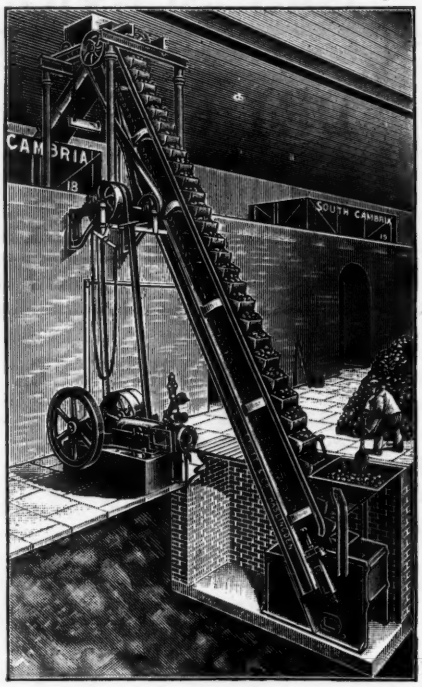

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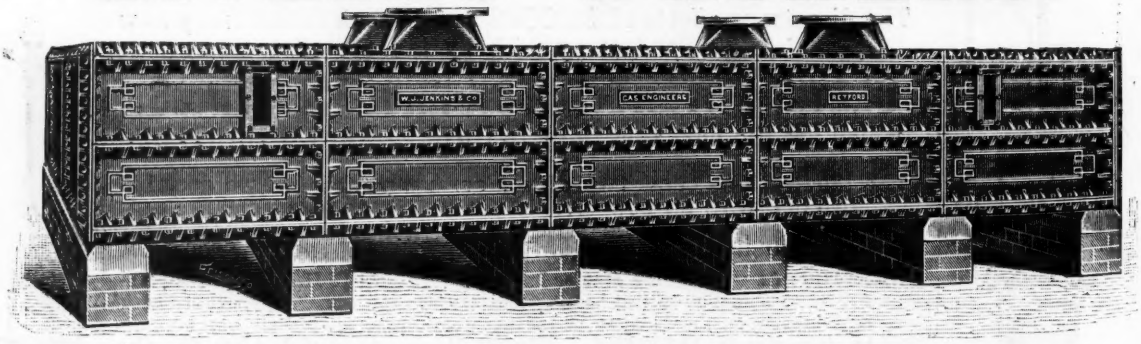

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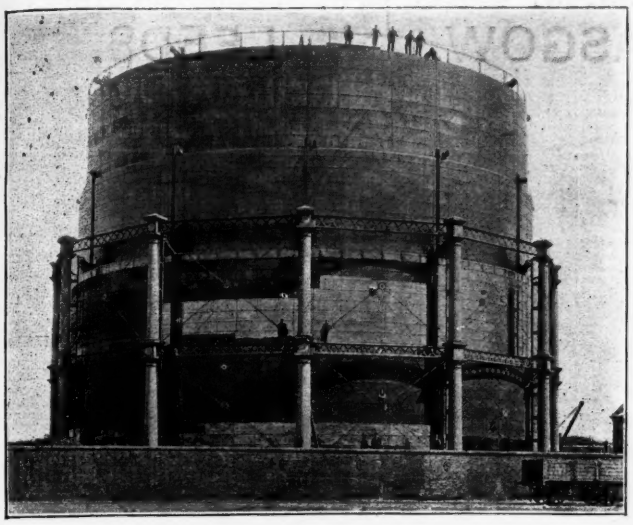

Four-Lift Gasholder, 120 ft. by 24 ft., three Lifts working on Patent Cables (Pease's System). Wallasey; 1897.

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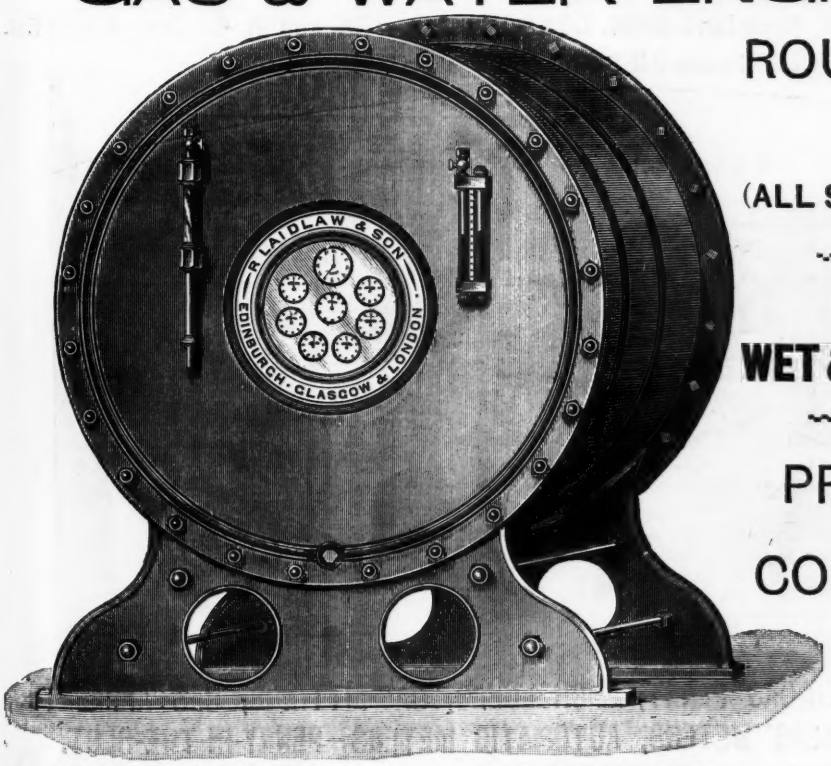

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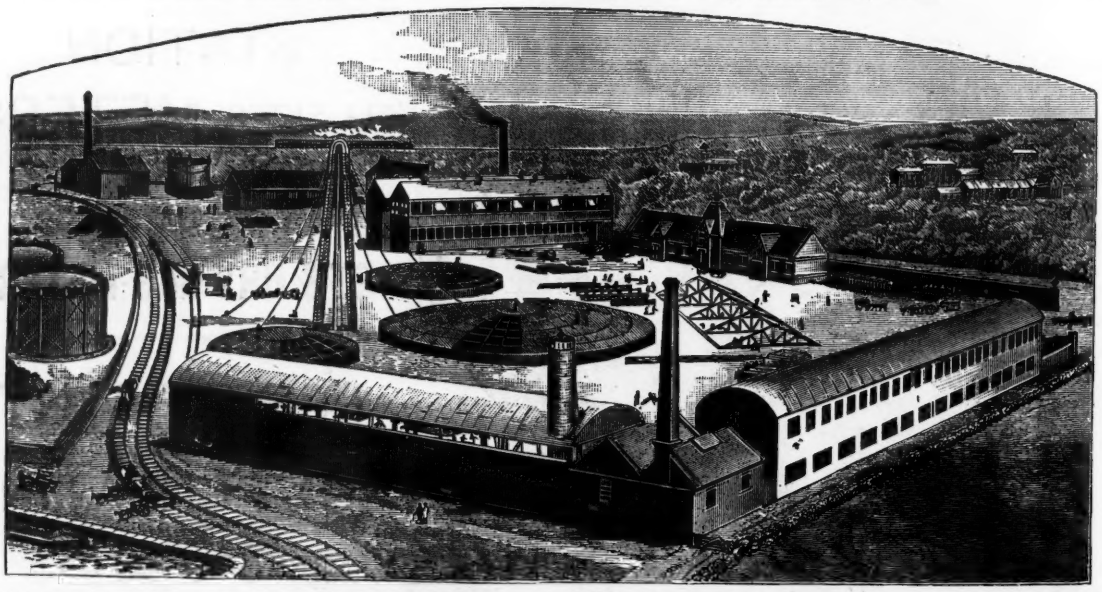

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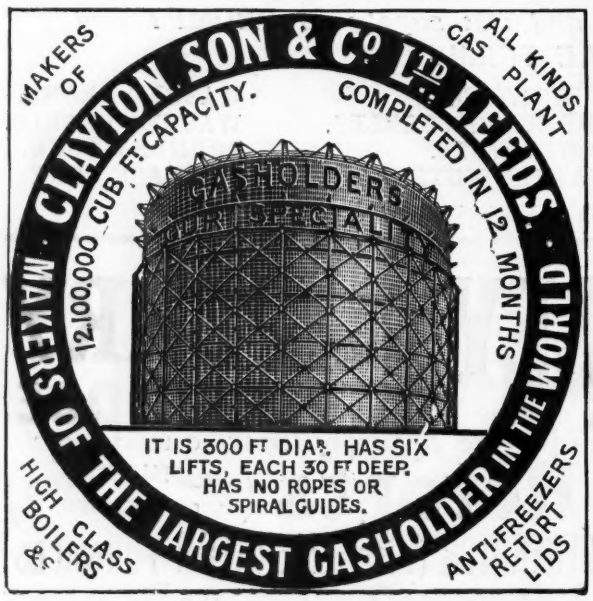
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[See also Advt. p. 420

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